NUMERICAL PERFORMANCE OF ABS CODES FOR NONLINEAR LEAST SQUARES [1]

E. Bodon [2], L. Lukšan [3] and E. Spedicato [4]

1 Introduction

The ABS algorithms for nonlinear least squares solve the nonlinear least squares problem $\min F(x)$, where F is a function $F : R^n \to R$, $F(x) = f(x)^T f(x) = \sum_{j=1}^m f_j^2(x)$, $f(x) = (f_1(x), f_2(x), \dots, f_m(x))^T$, $f_j(x)$, $j = 1, \dots, m$, are nonlinear function of x, $x \in R^n$, $m \geq n$. The ABS algorithms can be viewed as a modification of the Gauss-Newton method. Gauss-Newton method constructs an iterative sequence of points x_i, $i = 1, 2, \dots$ by the relation $x_{i+1} = x_i + t_i$, where t_i is the least squares solution of the overdetermined linear system $J(x_i)t_i = -f(x_i)$, where $J(x_i) = (a_1(x_i), a_2(x_i), \dots, a_n(x_i))$ indicates the Jacobian matrix of f evaluated at x_i, $a_k(x_i)$ denotes the k-th column of J evaluated at x_i. A modifies overdetermined system $Jt_i = -f$ is solved by the ABS method for linear least squares after modifying the definition of J and f. The motivation is based on the fact that at the k-th step the ABS algorithms for linear least squares can generate the next approximation to the solution t_i using the k-th column of J and some quantities used in computing the least squares solution $t_{i_{k-1}}$ of the overdetermined system formed by the first $k-1$ columns of J. Since the new approximate point $x_i + t_{i_{k-1}}$ is expected to be closer to the solution x^* of $\min F(x)$, it can be used to evaluated the k-th column of J. The procedure is the following.
Assign an initial vector x_0, set $i = 1$.
(*) Set $Y_1 = x_{i-1}$ and J_0 empty, for $k = 1$ to n:
evaluate $a_k(y_k)$ and set $J_k = [J_{k-1}, a_k(y_k)]$,
solve $J_k t_{i_k} = -f(y_k)$ by an ABS method for linear least squares,
compute $y_{k+1} = y_1 + t_{i_k}$.
Let $x_i = y_{n+1}$. If the stopping criterion is satisfied, stop; otherwise increment the index i by 1 and return to (*).
More details about ABS methods can be found in [1] and [2]. Source codes, written in Fortran 77, are given in [6].

2 Implemented ABS codes

The ABS codes that we have implemented based on the above algorithm use two well known ABS methods for the linear case, the Huang method and the implicit QR method. In the first code, routine `nlls_huang`, the sequence of the systems $J_k t_{i_k} = -f(y_k)$, $k = 1, \dots, n$ is solved factorizing J_k into the orthogonal matrix P_k and the lower triangular matrix L_k by using the Huang (Gram-Schmidt) algorithm. The process is the following.
Set P_0, L_0, D_0, c_0 empty, for $k = 1$ to n:
evaluate $a_k(y_k)$ and compute $l_k = P_{k-1}^T a_k(y_k)$, $p_k = a_k(y_k) - P_{k-1} D_{k-1}^{-1} l_k$, $\delta_k = p_k^T a_k(y_k)$,

[1] Work partly supported by grant GA CR 201/00/0080 and by MURST 1999 Programma di Cofinanziamento
[2] Department of Mathematics, University of Bergamo, Bergamo 24129, Italy (bodon@unibg.it)
[3] Institute of Computer Science, Academy of Sciences of the Czech Republic, Pod vodárenskou věží 2, 182 07 Prague 8, Czech Republic (luksan@uivt.cas.cz)
[4] Department of Mathematics, University of Bergamo, Bergamo 24129, Italy (emilio@unibg.it)

set $L_k^T = [L_{k-1}^T, (l_k^T, \delta_k)^T]$, $c_k = (c_{k-1}, -p_k^T f(y_k))^T$, solve $L_k^T t_{i_k} = c_k$,
compute $y_{k+1} = y_1 + t_{i_k}$, if $k < n$ set $P_k = [P_{k-1}, p_k]$, $D_k = \mathrm{diag}(\delta_1, \ldots, \delta_k)$.
In the same routine **nlls_huang** the vector p_k can be computed by the modified Huang method defined by $p_k = \bar{p}_k - P_{k-1} D_{k-1}^{-1} P_{k-1}^T \bar{p}_k$, $\bar{p}_k = a_k(y_k) - P_{k-1} D_{k-1}^{-1} l_k$, $\delta_k = p_k^T p_k$.
In one major iteration (consisting of a sequence of n minor iterates such that the system $Jt_i = -f$ is solved) the number of multiplications is $mn^2 + n^3/6$ for the Huang algorithm, $2mn^2 + n^3/6$ for the modified Huang algorithm. The memory requirement is $mn + n^2/2$.
In the second code, routine **nlls_iqr**, the sequence of the systems $J_k t_{i_k} = -f(y_k)$, $k = 1, \ldots, n$ is solved by the implicit QR algorithm. The process is the following.
Set P_0, V_0, D_0 empty, for $k = 1$ to n:
compute $l_k = V_{k-1}^T a_k(y_k)$, $p_k = e_k - P_{k-1} D_{k-1}^{-1} l_k$ (e_k is the k-th unit vector in R^n),
$v_k = J_k p_k$ or $v_k = a_k(y_k) - V_{k-1} D_{k-1}^{-1} l_k$, $\delta_k = v_k^T v_k$, $y_{k+1} = y_k - (v_k^T f(y_k)/\delta_k) p_k$
(y_{k+1} is the solution of the k-th system formed by the equations
$v_j^T a_j(y_j)(y - y_j) = -v_j^T f(y_j)$, $j - 1, \ldots, k$),
if $k < n$ set $P_k = [P_{k-1}, p_k]$, $V_k = [V_{k-1}, v_k]$, $D_k = \mathrm{diag}(\delta_1, \ldots, \delta_k)$.
In the same routine **nlls_iqr** the vectors p_k and v_k can be computed using a correction, that is $p_k = \bar{p}_k - P_{k-1} D_{k-1}^{-1} V_{k-1}^T J_k \bar{p}_k$, $\bar{p}_k = e_k - P_{k-1} D_{k-1}^{-1} l_k$,
$v_k = \bar{v}_k - V_{k-1} D_{k-1}^{-1} V_{k-1}^T \bar{v}_k$, $\bar{v} = J_k p_k$ or $\bar{v}_k = a_k(y_k) - V_{k-1} D_{k-1}^{-1} l_k$.
In one major iteration the number of multiplications is $mn^2 + n^3/6$, with the correction on p_k is $3mn^2/2 + n^3/3$, with the correction on v_k is $2mn^2 + n^3/6$, with the correction on p_k and v_k is $5mn^2/2 + n^3/3$. The memory requirement is $mn + n^2/2$.
In the third code, routine **nlls_iqr0**, the sequence of the system $J_k t_{i_k} = -f(y_k)$, $k = 1, \ldots, n$ is solved by the implicit QR algorithm using the following theoretically equivalent formulas for computing v_k and p_k,
$v_k = v_k^{(k)}$ where $v_k^{(1)} = a_k(y_k)$, $v_k^{(j+1)} = v_k^{(j)} - (v_k^{(j)T} v_{k-j}) a_{k-j}(y_{k-j})$, $j = 1, \ldots, k-1$,
the components of p_k are the coefficient used in $v_k^{(j+1)}$, that is
$p_k = (v_k^{(k-1)T} v_1/\delta_1, v_k^{(k-2)T} v_2/\delta_2, \ldots, v_k^{(1)T} v_{k-1}/\delta_{k-1}, 1, 0, \ldots, 0)^T$.
In the same routine **nlls_iqr0** the vector v_k can be computed using a correction
$v_k = v_k^{(k)}$ where $v_k^{(1)} = \bar{v}_k$, $v_k^{(j+1)} = v_k^{(j)} - (v_k^{(j)T} v_{k-j}/\delta_{k-j}) a_{k-j}(y_{k-j})$, $j = 1, \ldots, k-1$,
$\bar{v}_k = \bar{v}_k^{(k)}$ where $\bar{v}_k^{(1)} = a_k(y_k)$, $\bar{v}_k^{(j+1)} = \bar{v}_k^{(j)} - (\bar{v}_k^{(j)T} v_{k-j}/\delta_{k-j}) a_{k-j}(y_{k-j})$, $j = 1, \ldots, k-1$.
In one major iteration the number of multiplications is mn^2, with the correction on v_k is $2mn^2$. The memory requirement is mn. This routine requires less operations than the routine **nlls_iqr** because p_k is given while v_k is computed.
For the three codes, in a major iteration the number of function evaluations is n and the number of elements jacobian evaluations is mn.
The jacobian has not full rank if at least one column k is linearly dependent, in which case in all the algorithms the iteration continues setting $y_{k+1} = y_k$. In the theoretical ABS method the test for linearly dependence is $p_k = 0$ for the Huang algorithm and $v_k = 0$ for the implicit QR algorithm, in the present codes the test is done on the value of δ_k and the zero is substituted by a tolerance t or $t * \|a_k\|$ where t is given by the user.
The programs have four stopping criteria. The first criterion depends on a measure of the gradient $g_i = J(x_i)^T f(x_i)$, $\|g_i\|_2 \leq tolg$, the second criterion is based on a measure of the relative distance between consecutive iterates $\|x_{i+1} - x_i\|_\infty \leq tolx \|x_i\|_\infty$, the third criterion terminates the iterations if no progress occurs in decreasing the function after a fixed number n_s of steps, the fourth criterion terminates the iterations after a fixed number $itmax$ of steps. Moreover the programs stop in the case $\|f(x_i)\| \leq tolf$. The parameters t, $tolx$, $tolf$, $tolg$, n_s, $itmax$ are given by the user.

Optionally if F is increasing at an iteration i, the implemented algorithms can use a line search technique. Setting $\bar{x} = x_i$, the line search technique reduces the width of the interval between the points x_{i+1} and $\bar{x}$ by 1/2 (the new point is $\bar{x} = (x_{i-1} + \bar{x})/2$) and so on, until a point $\bar{x}$ is found where $F(\bar{x})$ decreases, or a maximum number n_{half} of halvings is achieved, where n_{half} is given by the the user.
The codes are written in Fortran 77 in double precision.

3 Numerical experiments

In this section, we present results of extended numerical experiments with 3 ABS algorithms for nonlinear least squares:

nlls_huangd – This double precision subroutine implements the Huang and the modified Huang algorithms [13]. A subroutine which computes columns of the Jacobian matrix is required.

nlls_iqrd – This double precision subroutine implements the implicit QR algorithm with various corrections. A subroutine which computes columns of the Jacobian matrix is required.

nlls_iqr0d – This double precision subroutine implements the implicit QR algorithm. A subroutine which computes columns of the Jacobian matrix is required.

The ABS subroutines use several input data, namely the maximum number of iterations $itmax$, the maximum number of unsuccessful steps n_s, the maximum number of line-search steps n_l, the tolerance for linear dependence t, the tolerance for norm of the iteration step $tolx$, the tolerance for sum of squares $tolf$ and the tolerance for the norm of gradient $tolg$. We have preliminarly tested several choices of these parameters to select the best values. In this way, we have taken values $itmax = 100$, $n_s = 20$, $n_l = 10$ (versions without line searches were less efficient), $t = 10^{-16}$, $tolx = 10^{-14}$, $tolf = 10^{-8}$, $tolg = 10^{-8}$. In all preliminary tests, the modified Huang algorithm gave the same number of successfully solved problems as the Huang algorithm, but the computational time required was greater. Therefore, we deleted the modified Huang algorithm from all tests presented in the Appendix. Also corrections of orthogonality in the implicit QR algorithm had no effect to the stability of the iterative process, but they increased the required computational time. Therefore, only experiments with the basic form of the implicit QR algorithm are introduced in the Appendix.
To compare the ABS codes with other codes for solving systems of nonlinear equations, we have selected several well-known subroutines which are broadly cited in the literature:

- Subroutines from the MINPACK library [11]. Subroutine `lmder` is a trust region realization of the Newton method and it requires analytically computed elements of the Jacobian matrices. Subroutine `lmstr` is a modification of the subroutine `lmder` which saves memory by using rows of the Jacobian matrix separately. Subroutine `lmdif` is a trust region realization of the discrete Newton method which does not use analytically computed derivatives.

- Subroutine `tensolve`, which is a line search or trust region realization of the Newton method with possible tensor corrections [8].

- Subroutine `dnls1`, which is a modification of the Levenberg-Marquardt method. This subtoutine was obtained from the SLATEC library. The version `dnls1_d`, does not use analytically computed derivatives

- Subroutine `dn2g`, which is a modification of the Algorithm 573 published in the Transactions on Mathematical Software [9].

- Subroutine `soneq4`, which is a simple realization of the Newton method with analytically or numerically computed derivatives. This subroutine was obtained from the UIVT library.

- Routines generated by the UFO system [22]. Routine `gsgm7` is a trust region realization of a combination of the Gauss-Newton and the variable metric methods. The version `gsgm7_d`, does not use analytically computed derivatives. Routine `qmgq1` is a trust region realization of the good Broyden method. The version `qmgq1_d`, does not use analytically computed derivatives.

All mentioned codes can be divided into two classes. The first class contains relatively simple algorithms, which are usually fast, but sometimes can fail being used for solving difficult problems. The ABS algorithms and `soneq4` belong to the first class. The second class contains algorithms based on complicated globalization strategies, which are robust but usually slower. The MINPACK subroutines, `tensolve`, `dnls1`, `dn2g` and the UFO routines belong to the second class.
All codes have been tested by using a collection of 62 problems with 100 and 200 variables. Problems 1 – 20 are precisely problems 21 –30 from [24]. Problems 21 – 62 of this collection are described in Section 4 (see also [21]) and they can be downloaded from the web page `http://www.cs.cas.cz/~luksan/test.html`.
Detailed results of our numerical experiments are arranged in the set of tables given in the Appendix. Rows of these tables correspond to individual problems. Each row contains the numbers of iterations (it), function evaluations (nf), Jacobian evaluations (nj), the reached norm (F), the information concerning the termination (inf) and the required computational time. Several problems could not be solved because of overflows or divisions by zero (invalid operations).
In the following tables, we give a summary of computational experiments. In these tables, it, nf, nj have the same meaning as in the Appendix, del is the number of deleted problems and suc is the number of succesfully solved problems (from 62 problems). Table 1 contains results corresponding to problems with 100 variables and Table 2 concerns problems with 200 variables.

Algorithm	it	nf	nj	del	suc	time
nlls_huangd	554	57757	554	2	29	0:40
nlls_iqrd	1466	157984	1466	7	30	1:01
nlls_iqrod	1480	159535	1480	7	30	1:20
lmder	3852	4324	3793	-	61	1:51
lmstr	3880	4347	3824	-	61	1:50
lmdif	2828	279884	0	-	60	1:46
tensolve	6320	8211	6320	-	57	2:02
dnls1	2974	6786	5832	-	60	1:27
dnls1_d	2231	439214	0	-	58	1:31
dn2g	2712	3418	2768	-	60	0:22
soneq4	573	1871	579	2	38	0:05
gsgm7	2507	2807	2569	-	62	1:27
gsgm7_d	2630	271699	0	-	62	0:18
qmgq1_d	7508	121383	0	-	60	3:10

Table 1 – results for 100 variables

Algorithm	it	nf	nj	del	suc	time
nlls_huangd	405	82276	405	7	28	1:03
nlls_iqrd	857	177006	857	14	28	1:43
nlls_iqrod	910	188194	910	15	28	2:38
lmder	3594	4006	3535	-	61	12:19
lmstr	3569	3964	3510	-	61	13:19
lmdif	2827	566568	0	-	60	12:55
tensolve	6053	7444	6053	-	56	13:35
dnls1	3197	7274	6276	-	61	11:21
dnls1_d	2828	1165	481	-	60	12:59
dn2g	3031	4007	3087	-	59	33:46
soneq4	900	5111	907	1	40	1:13
gsgm7	3408	3938	3353	-	62	16:38
gsgm7_d			0	-	61	20:02
qmgq1_d	10128	345652	0	-	57	30:11

Table 2 – results for 200 variables

Notice that computational times given in the above tables do not express the computational efficiency of inidividual algorithms entirely, since many (usually the most dificult) problems were often deleted from the tests.
Results given in the above tables (and in the Appendix) imply several conclusions.

- Present implementations of the ABS algorithms can be considered as average methods for solving nonlinear least squares problems. They are very fast, competitive with the best algorithms tested. Unfortunately, many problems were not solved because of invalid operations and unsuitable stepsizes. This is caused by the fact that function evaluations are performed at points which can be rather far from the best up-to-date estimation of the minimum. Nonlinear Huang algorithm is slightly better than implicit QR algorithm, especially for large-scale problems.

- From the algorithms tested, the very simple subroutine `soneq4` (it contains 140 Fortran lines) is surprisingly the fastest and relatively successful. Subroutines from the MINPACK and SLATEC librarries are very robust and efficient. Similar propertie have codes generated by the UFO system. Subroutines `tensolve`, and `dn2g` are slightly less efficient. Globally convergent algorithms are time consuming, since they do not terminate computations even if the rate of convergence is very slow. Instead of the termination, they try to found the best strategy for a further progress.

4 Test problems for large-scale systems of nonlinear equations

We seek a local minimum of the function

$$F(x) = \frac{1}{2}\sum_{k=1}^{n_A} f_k^2(x), \quad x \in R^n,$$

from the starting point $\bar{x}$. For positive integers k and l, we use the notation $\text{div}(k,l)$ for integer division, i.e., maximum integer not greater than k/l, and $\text{mod}(k,l)$ for the remainder after integer division, i.e., $\text{mod}(k,l) = l(k/l - \text{div}(k,l))$. Problems 1 – 10 are precisely problems 21 – 30 from [24]. The description of problems 11 – 62 follows.

Problem 11. Chained Rosenbrock function [18].

$$\begin{aligned}
f_k(x) &= 10(x_i^2 - x_{i+1}) \quad , \quad \text{mod}(k,2) = 1 \\
f_k(x) &= x_i - 1 \quad , \quad \text{mod}(k,2) = 0 \\
n_A &= 2(n-1), \quad i = \text{div}(k+1,2) \\
\bar{x}_l &= -1.2, \quad \text{mod}(l,2) = 1, \qquad \bar{x}_l = 1.0, \quad \text{mod}(l,2) = 0
\end{aligned}$$

Problem 12. Chained Wood function [27].

$$\begin{aligned}
f_k(x) &= 10(x_i^2 - x_{i+1}) \quad , \quad \text{mod}(k,6) = 1 \\
f_k(x) &= x_i - 1 \quad , \quad \text{mod}(k,6) = 2 \\
f_k(x) &= \sqrt{90}\,(x_{i+2}^2 - x_{i+3}) \quad , \quad \text{mod}(k,6) = 3 \\
f_k(x) &= x_{i+2} - 1 \quad , \quad \text{mod}(k,6) = 4 \\
f_k(x) &= \sqrt{10}\,(x_{i+1} + x_{i+3} - 2) \quad , \quad \text{mod}(k,6) = 5 \\
f_k(x) &= (x_{i+1} - x_{i+3})/\sqrt{10} \quad , \quad \text{mod}(k,6) = 0 \\
n_A &= 3(n-2), \quad i = 2\,\text{div}(k+5,6) - 1 \\
\bar{x}_l &= -3, \quad \text{mod}(l,2) = 1, \quad l \le 4, \qquad \bar{x}_l = -2, \quad \text{mod}(l,2) = 1, \quad l > 4 \\
\bar{x}_l &= -1, \quad \text{mod}(l,2) = 0, \quad l \ge 4, \qquad \bar{x}_l = 0, \quad \text{mod}(l,2) = 0, \quad l < 4
\end{aligned}$$

Problem 13. Chained Powell singular function [18].

$$\begin{aligned}
f_k(x) &= x_i + 10x_{i+1} \quad , \quad \text{mod}(k,4) = 1 \\
f_k(x) &= \sqrt{5}\,(x_{i+2} - x_{i+3}) \quad , \quad \text{mod}(k,4) = 2 \\
f_k(x) &= (x_{i+1} - 2x_{i+2})^2 \quad , \quad \text{mod}(k,4) = 3 \\
f_k(x) &= \sqrt{10}\,(x_i - x_{i+3})^2 \quad , \quad \text{mod}(k,4) = 0
\end{aligned}$$

$$
\begin{aligned}
n_A &= 2(n-2), \quad i = 2\,\mathrm{div}(k+3,4)-1 \\
\bar{x}_l &= 3, \quad \mathrm{mod}(l,4)=1, \qquad \bar{x}_l = -1, \quad \mathrm{mod}(l,4)=2 \\
\bar{x}_l &= 0, \quad \mathrm{mod}(l,4)=3, \qquad \bar{x}_l = 1, \quad \mathrm{mod}(l,4)=0
\end{aligned}
$$

Problem 14. Chained Cragg and Levy function [27].

$$
\begin{aligned}
f_k(x) &= (\exp(x_i) - x_{i+1})^2 \quad , \quad \mathrm{mod}(k,5)=1 \\
f_k(x) &= 10(x_{i+1} - x_{i+2})^3 \quad , \quad \mathrm{mod}(k,5)=2 \\
f_k(x) &= \frac{\sin^2(x_{i+2} - x_{i+3})}{\cos^2(x_{i+2} - x_{i+3})} \quad , \quad \mathrm{mod}(k,5)=3 \\
f_k(x) &= x_i^4 \quad , \quad \mathrm{mod}(k,5)=4 \\
f_k(x) &= x_{i+3} - 1 \quad , \quad \mathrm{mod}(k,5)=0 \\
n_A &= 5(n-2)/2, \quad i = 2\,\mathrm{div}(k+4,5)-1 \\
\bar{x}_l &= 1 \quad ,l=1 \quad , \quad \bar{x}_l = 2 \quad , \quad l>1
\end{aligned}
$$

Problem 15. Generalized Broyden tridiagonal function [18].

$$
\begin{aligned}
f_k(x) &= (3-2x_k)\,x_k + 1 - x_{k-1} - x_{k+1} \\
n_A &= n, \quad x_0 = x_{n+1} = 0 \\
\bar{x}_l &= -1, \quad l \ge 1
\end{aligned}
$$

Problem 16. Generalized Broyden banded function [18].

$$
\begin{aligned}
f_k(x) &= (2+5x_k^2)x_k + 1 + \sum_{j=k_1}^{k_2} x_j(1+x_j) \\
n_A &= n, \quad k_1 = \max(1,k-5), \quad k_2 = \min(n,k+1) \\
\bar{x}_l &= -1, \quad l \ge 1
\end{aligned}
$$

Problem 17. Chained Freudenstein and Roth function [27].

$$
\begin{aligned}
f_k(x) &= x_i + x_{i+1}((5-x_{i+1})x_{i+1}-2) - 13 \;, \quad \mathrm{mod}(k,2)=1 \\
f_k(x) &= x_i + x_{i+1}((1+x_{i+1})x_{i+1}-14) - 29, \quad \mathrm{mod}(k,2)=0 \\
n_A &= 2(n-1), \quad i = \mathrm{div}(k+1,2) \\
\bar{x}_l &= 0.5, \quad l<n, \qquad \bar{x}_l = -2, \quad l=n
\end{aligned}
$$

Problem 18. Wright and Holt zero residual problem [28].

$$
\begin{aligned}
f_k(x) &= (x_i^a - x_j^b)^c \\
a &= 1, \qquad k \le m/2, \qquad a = 2, \quad k > m/2 \\
b &= 5 - \mathrm{div}(k, m/4), \qquad c = \mathrm{mod}(k,5)+1 \\
n_A &= 5n, \quad i = \mathrm{mod}(k,n/2)+1, \quad j = i + n/2 \\
\bar{x}_l &= \sin^2(l), \quad l \ge 1
\end{aligned}
$$

Problem 19. Toint quadratic merging problem [27].

$$
f_k(x) = x_i + 3x_{i+1}(x_{i+2}-1) + x_{i+3}^2 - 1 \qquad , \quad \mathrm{mod}(k,6)=1
$$

$$
\begin{aligned}
f_k(x) &= (x_i + x_{i+1})^2 + (x_{i+2} - 1)^2 - x_{i+3} - 3 &&, \quad \bmod(k,6) = 2 \\
f_k(x) &= x_i x_{i+1} - x_{i+2} x_{i+3} &&, \quad \bmod(k,6) = 3 \\
f_k(x) &= 2x_i x_{i+2} + x_{i+1} x_{i+3} - 3 &&, \quad \bmod(k,6) = 4 \\
f_k(x) &= (x_i + x_{i+1} + x_{i+2} + x_{i+3})^2 + (x_i - 1)^2 &&, \quad \bmod(k,6) = 5 \\
f_k(x) &= x_i x_{i+1} x_{i+2} x_{i+3} + (x_{i+3} - 1)^2 - 1 &&, \quad \bmod(k,6) = 0 \\
n_A &= 3(n-2), \quad i = 2\,\mathrm{div}(k+5,6) - 1 \\
\bar{x}_l &= 5, \quad l \ge 1
\end{aligned}
$$

Problem 20. Chained exponential problem [18].

$$
\begin{aligned}
f_k(x) &= 4 - \exp(x_i) - \exp(x_{i+1}) &&, \quad \bmod(k,2) = 1, \ \ i = 1 \\
f_k(x) &= 8 - \exp(3x_{i-1}) - \exp(3x_i) \\
&+ \ 4 - \exp(x_i) - \exp(x_{i+1}) &&, \quad \bmod(k,2) = 1, \ \ 1 < i < n \\
f_k(x) &= 8 - \exp(3x_{i-1}) - \exp(3x_i) &&, \quad \bmod(k,2) = 1, \ \ i = n \\
f_k(x) &= 6 - \exp(2x_i) - \exp(2x_{i+1}) &&, \quad \bmod(k,2) = 0 \\
n_A &= 2n - 1, \quad i = \mathrm{div}(k+1,2) \\
\bar{x}_l &= 0.2, \quad l \ge 1
\end{aligned}
$$

Problem 21. Chained serpentine function [19].

$$
\begin{aligned}
f_k(x) &= 10(2x_i/(1+x_i^2) - x_{i+1}) &&, \quad \bmod(k,2) = 1, \\
f_k(x) &= x_i - 1 &&, \quad \bmod(k,2) = 0, \\
i &= \mathrm{div}(k+1,2), \\
\bar{x}_l &= -0.8, \quad l \ge 1.
\end{aligned}
$$

Problem 22. Chained and modified problem HS47 [19].

$$
\begin{aligned}
f_k(x) &= 10(x_i^2 - x_{i+1}) &&, \quad \bmod(k,6) = 1, \\
f_k(x) &= x_{i+2} - 1 &&, \quad \bmod(k,6) = 2, \\
f_k(x) &= (x_{i+3} - 1)^2 &&, \quad \bmod(k,6) = 3, \\
f_k(x) &= (x_{i+4} - 1)^3 &&, \quad \bmod(k,6) = 4, \\
f_k(x) &= x_i^2 x_{i+3} + \sin(x_{i+3} - x_{i+4}) - 10 &&, \quad \bmod(k,6) = 5, \\
f_k(x) &= x_{i+1} + x_{i+2}^4 x_{i+3}^2 - 20 &&, \quad \bmod(k,6) = 0, \\
i &= 3\,\mathrm{div}(k+5,6) - 2, \\
\bar{x}_l &= -1, \quad l \ge 1.
\end{aligned}
$$

Problem 23. Chained and modified problem HS48 [19].

$$
\begin{aligned}
f_k(x) &= 10(x_i^2 - x_{i+1}) &&, \quad \bmod(k,7) = 1, \\
f_k(x) &= 10(x_{i+1}^2 - x_{i+2}) &&, \quad \bmod(k,7) = 2, \\
f_k(x) &= (x_{i+2} - x_{i+3})^2 &&, \quad \bmod(k,7) = 3, \\
f_k(x) &= (x_{i+3} - x_{i+4})^2 &&, \quad \bmod(k,7) = 4, \\
f_k(x) &= x_i + x_{i+1}^2 + x_{i+2} - 30 &&, \quad \bmod(k,7) = 5, \\
f_k(x) &= x_{i+1} - x_{i+2}^2 + x_{i+3} - 10 &&, \quad \bmod(k,7) = 6,
\end{aligned}
$$

$$
\begin{aligned}
f_k(x) &= x_i x_{i+4} - 10 \qquad , \quad \mathrm{mod}(k,7)=0,\\
i &= 3\,\mathrm{div}(k+6,7)-2,\\
\bar{x}_l &= -1, \quad l \geq 1.
\end{aligned}
$$

Problem 24. Sparse signomial function [19].

$$
\begin{aligned}
f_k(x) &= y_j - \sum_{p=1}^{3}(p^2/j)\prod_{q=1}^{4}\mathrm{sign}(x_{i+q})|x_{i+q}|^{q/(pj)}\\
i &= 2\,\mathrm{div}(k+3,4)-2, \quad j = \mathrm{mod}(k-1,4)+1,\\
\bar{x}_l &= -0.8 \quad , \quad \mathrm{mod}(l,4)=1, \quad y_1 = 14.4,\\
\bar{x}_l &= 1.2 \quad , \quad \mathrm{mod}(l,4)=2, \quad y_2 = 6.8,\\
\bar{x}_l &= -1.2 \quad , \quad \mathrm{mod}(l,4)=3, \quad y_3 = 4.2,\\
\bar{x}_l &= 0.8 \quad , \quad \mathrm{mod}(l,4)=0, \quad y_4 = 3.2.
\end{aligned}
$$

Problem 25. Sparse exponential function [19].

$$
\begin{aligned}
f_k(x) &= y_j - \sum_{p=1}^{3}(p^2/j)\exp\left(\sum_{q=1}^{4} x_{i+q}q/(pj)\right),\\
i &= 2\,\mathrm{div}(k+3,4)-2, \quad j = \mathrm{mod}(k-1,4)+1,\\
\bar{x}_l &= -0.8 \quad , \quad \mathrm{mod}(l,4)=1, \quad y_1 = 35.8,\\
\bar{x}_l &= 1.2 \quad , \quad \mathrm{mod}(l,4)=2, \quad y_2 = 11.2,\\
\bar{x}_l &= -1.2 \quad , \quad \mathrm{mod}(l,4)=3, \quad y_3 = 6.2,\\
\bar{x}_l &= 0.8 \quad , \quad \mathrm{mod}(l,4)=0, \quad y_4 = 4.4.
\end{aligned}
$$

Problem 26. Sparse trigonometric function [19].
This is a sparse version of the trigonometric function proposed in Ref. 7.

$$
\begin{aligned}
f_k(x) &= y_j - \sum_{q=1}^{4}[(-1)^q jq^2\sin(x_{i+q}) + j^2 q\cos(x_{i+q})],\\
i &= 2\,\mathrm{div}(k+3,4)-2, \quad j = \mathrm{mod}(k-1,4)+1,\\
\bar{x}_i &= -0.8 \quad , \quad \mathrm{mod}(l,4)=1, \quad y_1 = 30.6,\\
\bar{x}_i &= 1.2 \quad , \quad \mathrm{mod}(l,4)=2, \quad y_2 = 72.2,\\
\bar{x}_i &= -1.2 \quad , \quad \mathrm{mod}(l,4)=3, \quad y_3 = 124.4,\\
\bar{x}_i &= 0.8 \quad , \quad \mathrm{mod}(l,4)=0, \quad y_4 = 187.4.
\end{aligned}
$$

Problem 27. Countercurrent reactors problem 1 [7] (modifiied).

$$
\begin{aligned}
f_k(x) &= \alpha - (1-\alpha)x_{k+2} - x_k(1+4x_{k+1}) \quad , \ k=1\\
f_k(x) &= -(2-\alpha)x_{k+2} - x_k(1+4x_{k-1}) \quad , \ k=2\\
f_k(x) &= \alpha x_{k-2} - (1-\alpha)x_{k+2} - x_k(1+4x_{k+1}) \quad , \ \mathrm{mod}\ (k,2)=1\ , \ \ 2<k<n-1\\
f_k(x) &= \alpha x_{k-2} - (2-\alpha)x_{k+2} - x_k(1+4x_{k-1}) \quad , \ \mathrm{mod}\ (k,2)=0\ , \ \ 2<k<n-1\\
f_k(x) &= \alpha x_{k-2} - x_k(1+4x_{k+1}) \quad , \ k=n-1\\
f_k(x) &= \alpha x_{k-2} - (2-\alpha) - x_k(1+4x_{k-1}) \quad , \ k=n\\
\alpha &= 1/2
\end{aligned}
$$

$$
\begin{array}{lllllll}
\overline{x}_l & = & 0.1 & , \bmod (l,8) = 1, & \overline{x}_l & = & 0.2 & , \bmod (l,8) = 2 \\
\overline{x}_l & = & 0.3 & , \bmod (l,8) = 3, & \overline{x}_l & = & 0.4 & , \bmod (l,8) = 4 \\
\overline{x}_l & = & 0.5 & , \bmod (l,8) = 5, & \overline{x}_l & = & 0.4 & , \bmod (l,8) = 6 \\
\overline{x}_l & = & 0.3 & , \bmod (l,8) = 7, & \overline{x}_l & = & 0.2 & , \bmod (l,8) = 0
\end{array}
$$

Problem 28. Tridiagonal system [17].

$$
\begin{array}{rcll}
f_k(x) & = & 4(x_k - x_{k+1}^2) & , \; k = 1 \\
f_k(x) & = & 8x_k(x_k^2 - x_{k-1}) - 2(1 - x_k) + 4(x_k - x_{k+1}^2) & , \; 1 < k < n \\
f_k(x) & = & 8x_k(x_k^2 - x_{k-1}) - 2(1 - x_k) & , \; k = n \\
\overline{x}_l & = & 12, \quad l \geq 1 &
\end{array}
$$

Problem 29. Structured Jacobian problem [12].

$$
\begin{array}{rcll}
f_k(x) & = & -2x_k^2 + 3x_k - 2x_{k+1} + 3x_{n-4} - x_{n-3} & \\
 & - & x_{n-2} + 0.5x_{n-1} - x_n + 1 & , \; k = 1 \\
f_k(x) & = & -2x_k^2 + 3x_k - x_{k-1} - 2x_{k+1} + 3x_{n-4} - x_{n-3} & \\
 & - & x_{n-2} + 0.5x_{n-1} - x_n + 1 & , \; 1 < k < n \\
f_k(x) & = & -2x_k^2 + 3x_k - x_{k-1} + 3x_{n-4} - x_{n-3} & \\
 & - & x_{n-2} + 0.5x_{n-1} - x_n + 1 & , \; k = n \\
\overline{x}_l & = & -1, \quad l \geq 1 &
\end{array}
$$

Problem 30. Shifted discrete boundary value problem [19].

$$
\begin{array}{rcll}
f_k(x) & = & 2x_k + 0.5h^2(x_k + hk)^3 - x_{k+1} + 1 & , \; k = 1 \\
f_k(x) & = & 2x_k + 0.5h^2(x_k + hk)^3 - x_{k-1} - x_{k+1} + 1 & , \; 1 < k < n \\
f_k(x) & = & 2x_k + 0.5h^2(x_k + hk)^3 - x_{k-1} + 1 & , \; k = n \\
h & = & 1/(n+1) & \\
\overline{x}_l & = & lh(lh - 1), \quad i \geq 1 &
\end{array}
$$

Problem 31. Modified discrete boundary value problem [19].

$$
\begin{array}{rcl}
f_k(x) & = & 2x_k + (1/2)h^2(x_k + hk + 1)^3 - x_{k-1} - x_{k+1} + 1 \\
h & = & 1/(n+1), \quad x_0 \;=\; x_{n+1} = 0 \\
\bar{x}_l & = & -1, \quad l \geq 1
\end{array}
$$

Problem 32. Attracting-Repelling problem [19].

$$
\begin{array}{rcll}
f_k(x) & = & x_1 - 1 & , \quad k = 1 \\
f_k(x) & = & 10(x_i^2 - x_{i+1}), & , \quad k > 1, \quad \mathrm{mod}(k,2) = 0 \\
f_k(x) & = & 2\exp(-(x_i - x_{i+1})^2) + \exp(-2(x_{i+1} - x_{i+2})^2) & , \quad k > 1, \quad \mathrm{mod}(k,2) = 1 \\
i & = & \mathrm{div}(k,2) & \\
\bar{x}_l & = & -1.2 \;, \quad \mathrm{mod}(l,2) = 1, \qquad \bar{x}_l = 1.0 \;, \quad \mathrm{mod}(l,2) = 0 &
\end{array}
$$

Problem 33. Countercurrent reactors problem 1 [7] (modified).

$$\begin{aligned}
f_k(x) &= \alpha - (1-\alpha)x_{k+2} - x_k(1+4x_{k+1}) && , \ k=1 \\
f_k(x) &= -(2-\alpha)x_{k+2} - x_k(1+4x_{k-1}) && , \ k=2 \\
f_k(x) &= \alpha x_{k-2} - (1-\alpha)x_{k+2} - x_k(1+4x_{k+1}) && , \ \mathrm{mod}\ (k,2)=1\ , \ \ 2<k<n-1 \\
f_k(x) &= \alpha x_{k-2} - (2-\alpha)x_{k+2} - x_k(1+4x_{k-1}) && , \ \mathrm{mod}\ (k,2)=0\ , \ \ 2<k<n-1 \\
f_k(x) &= \alpha x_{k-2} - x_k(1+4x_{k+1}) && , \ k=n-1 \\
f_k(x) &= \alpha x_{k-2} - (2-\alpha) - x_k(1+4x_{k-1}) && , \ k=n \\
\alpha &= 1/2 \\
\overline{x}_i &= 0.1 \quad , \ \mathrm{mod}\ (i,8)=1 \\
\overline{x}_i &= 0.2 \quad , \ \mathrm{mod}\ (i,8)=2 \ \text{ or } \ \mathrm{mod}\ (i,8)=0 \\
\overline{x}_i &= 0.3 \quad , \ \mathrm{mod}\ (i,8)=3 \ \text{ or } \ \mathrm{mod}\ (i,8)=7 \\
\overline{x}_i &= 0.4 \quad , \ \mathrm{mod}\ (i,8)=4 \ \text{ or } \ \mathrm{mod}\ (i,8)=6 \\
\overline{x}_i &= 0.5 \quad , \ \mathrm{mod}\ (i,8)=5
\end{aligned}$$

Problem 34. Countercurrent reactors problem 2 [7] (modified).

$$\begin{aligned}
f_k(x) &= x_1 - (1-x_1)x_{k+2} - \alpha(1+4x_{k+1}) && , \ k=1 \\
f_k(x) &= -(1-x_1)x_{k+2} - \alpha(1+4x_k) && , \ k=2 \\
f_k(x) &= \alpha x_1 - (1-x_1)x_{k+2} - x_k(1+4x_{k-1}) && , \ k=3 \\
f_k(x) &= x_1x_{k-2} + (1-x_1)x_{k+2} - x_k(1+4x_{k-1}) && , \ 3<k<n-1 \\
f_k(x) &= x_1x_{k-2} + x_k(1+4x_{k-1}) && , \ k=n-1 \\
f_k(x) &= x_1x_{k-2} - (1-x_1) - x_k(1+4x_{k-1}) && , \ k=n \\
\alpha &= 0.414214 \\
\overline{x}_i &= 0.1 \ , \ \mathrm{mod}\ (i,8)=1, && \overline{x}_i = 0.2 \ , \ \mathrm{mod}\ (i,8)=2 \\
\overline{x}_i &= 0.3 \ , \ \mathrm{mod}\ (i,8)=3, && \overline{x}_i = 0.4 \ , \ \mathrm{mod}\ (i,8)=4 \\
\overline{x}_i &= 0.5 \ , \ \mathrm{mod}\ (i,8)=5, && \overline{x}_i = 0.4 \ , \ \mathrm{mod}\ (i,8)=6 \\
\overline{x}_i &= 0.3 \ , \ \mathrm{mod}\ (i,8)=7, && \overline{x}_i = 0.2 \ , \ \mathrm{mod}\ (i,8)=0
\end{aligned}$$

Problem 35. Trigonometric system [26].

$$\begin{aligned}
f_k(x) &= 5 - (l+1)(1-\cos x_k) - \sin x_k - \sum_{j=5l+1}^{5l+5} \cos x_j \\
l &= \mathrm{div}(k-1,5) \\
\overline{x_i} &= 1/n, \quad i \geq 1
\end{aligned}$$

Problem 36. Trigonometric - exponential system (trigexp 1) [26].

$$\begin{aligned}
f_k(x) &= 3x_k^3 + 2x_{k+1} - 5 + \sin(x_k - x_{k+1})\sin(x_k + x_{k+1})\ , && k=1 \\
f_k(x) &= 3x_k^3 + 2x_{k+1} - 5 + \sin(x_k - x_{k+1})\sin(x_k + x_{k+1}) \\
&+ 4x_k - x_{k-1}\exp(x_{k-1} - x_k) - 3 && , \quad 1<k<n \\
f_k(x) &= 4x_k - x_{k-1}\exp(x_{k-1} - x_k) - 3 && , \quad k=n \\
\overline{x}_i &= 0, \quad i \geq 1
\end{aligned}$$

Problem 37. Trigonometric - exponential system (trigexp 2) [26].

$$
\begin{aligned}
f_k(x) &= 3(x_k - x_{k+2})^3 - 5 + 2x_{k+1} \\
&+ \sin(x_k - x_{k+1} - x_{k+2})\sin(x_k + x_{k+1} - x_{k+2}) \quad , \bmod (k,2) = 1,\ k = 1 \\
f_k(x) &= -6(x_{k-2} - x_k)^3 + 10 - 4x_{k-1} \\
&- 2\sin(x_{k-2} - x_{k-1} - x_k)\sin(x_{k-2} + x_{k-1} - x_k) \\
&+ 3(x_k - x_{k+2})^3 - 5 + 2x_{k+1} \\
&+ \sin(x_k - x_{k+1} - x_{k+2})\sin(x_k + x_{k+1} - x_{k+2}) \quad , \bmod (k,2) = 1,\ 1 < k < n \\
f_k(x) &= -6(x_{k-2} - x_k)^3 + 10 - 4x_{k-1} \\
&- 2\sin(x_{k-2} - x_{k-1} - x_k)\sin(x_{k-2} + x_{k-1} - x_k) \quad , \bmod (k,2) = 1,\ k = n \\
f_k(x) &= 4x_k - (x_{k-1} - x_{k+1})\exp(x_{k-1} - x_k - x_{k+1}) - 3 \quad , \bmod (k,2) = 0 \\
\overline{x}_i &= 1, \quad i \geq 1
\end{aligned}
$$

Problem 38. Singular Broyden problem [12].

$$
\begin{aligned}
f_k(x) &= ((3 - 2x_k)x_k - 2x_{k+1} + 1)^2 \quad , k = 1 \\
f_k(x) &= ((3 - 2x_k)x_k - x_{k-1} - 2x_{k+1} + 1)^2 \quad , 1 < k < n \\
f_k(x) &= ((3 - 2x_k)x_k - x_{k-1} + 1)^2 \quad , k = n \\
\overline{x}_i &= -1, \quad i \geq 1
\end{aligned}
$$

Problem 39. Tridiagonal system [17].

$$
\begin{aligned}
f_k(x) &= 4(x_k - x_{k+1}^2) \quad , k = 1 \\
f_k(x) &= 8x_k(x_k^2 - x_{k-1}) - 2(1 - x_k) + 4(x_k - x_{k+1}^2) \quad , 1 < k < n \\
f_k(x) &= 8x_k(x_k^2 - x_{k-1}) - 2(1 - x_k) \quad , k = n \\
\overline{x}_i &= 12, \quad i \geq 1
\end{aligned}
$$

Problem 40. Five-diagonal system [17].

$$
\begin{aligned}
f_k(x) &= 4(x_k - x_{k+1}^2) + x_{k+1} - x_{k+2}^2 \quad , k = 1 \\
f_k(x) &= 8x_k(x_k^2 - x_{k-1}) - 2(1 - x_k) \\
&+ 4(x_k - x_{k+1}^2) + x_{k+1} - x_{k+2}^2 \quad , k = 2 \\
f_k(x) &= 8x_k(x_k^2 - x_{k-1}) - 2(1 - x_k) \\
&+ 4(x_k - x_{k+1}^2) + x_{k-1}^2 - x_{k-2} + x_{k+1} - x_{k+2}^2 \quad , 2 < k < n-1 \\
f_k(x) &= 8x_k(x_k^2 - x_{k-1}) - 2(1 - x_k) \\
&+ 4(x_k - x_{k+1}^2) + x_{k-1}^2 - x_{k-2} \quad , k = n-1 \\
f_k(x) &= 8x_k(x_k^2 - x_{k-1}) - 2(1 - x_k) + x_{k-1}^2 - x_{k-2} \quad , k = n \\
\overline{x}_i &= -2, \quad i \geq 1
\end{aligned}
$$

Problem 41. Seven-diagonal system [17].

$$
\begin{aligned}
f_k(x) &= 4(x_k - x_{k+1}^2) + x_{k+1} - x_{k+2}^2 + x_{k+2} - x_{k+3}^2 \quad , k = 1 \\
f_k(x) &= 8x_k(x_k^2 - x_{k-1}) - 2(1 - x_k) \\
&+ 4(x_k - x_{k+1}^2) + x_{k-1}^2 + x_{k+1} - x_{k+2}^2 + x_{k+2} - x_{k+3}^2 \quad , k = 2 \\
f_k(x) &= 8x_k(x_k^2 - x_{k-1}) - 2(1 - x_k)
\end{aligned}
$$

$$
\begin{aligned}
&+ \quad 4(x_k - x_{k+1}^2) + x_{k-1}^2 - x_{k-2} + x_{k+1} - x_{k+2}^2 \\
&+ \quad x_{k-2}^2 + x_{k+2} - x_{k+3}^2 && , \ k = 3 \\
f_k(x) &= 8x_k(x_k^2 - x_{k-1}) - 2(1 - x_k) \\
&+ \quad 4(x_k - x_{k+1}^2) + x_{k-1}^2 - x_{k-2} + x_{k+1} - x_{k+2}^2 \\
&+ \quad x_{k-2}^2 + x_{k+2} - x_{k-3} - x_{k+3}^2 && , \ 3 < k < n-2 \\
f_k(x) &= 8x_k(x_k^2 - x_{k-1}) - 2(1 - x_k) \\
&+ \quad 4(x_k - x_{k+1}^2) + x_{k-1}^2 - x_{k-2} + x_{k+1} - x_{k+2}^2 \\
&+ \quad x_{k-2}^2 + x_{k+2} - x_{k-3} && , \ k = n-2 \\
f_k(x) &= 8x_k(x_k^2 - x_{k-1}) - 2(1 - x_k) \\
&+ \quad 4(x_k - x_{k+1}^2) + x_{k-1}^2 - x_{k-2} + x_{k+1} \\
&+ \quad x_{k-2}^2 - x_{k-3} && , \ k = n-1 \\
f_k(x) &= 8x_k(x_k^2 - x_{k-1}) - 2(1 - x_k) + x_{k-1}^2 - x_{k-2} \\
&+ \quad x_{k-2}^2 - x_{k-3} && , \ k = n \\
\overline{x}_i &= -3, \quad i \geq 1
\end{aligned}
$$

Problem 42. Structured Jacobian problem [12].

$$
\begin{aligned}
f_k(x) &= -2x_k^2 + 3x_k - 2x_{k+1} + 3x_{n-4} - x_{n-3} \\
&- \quad x_{n-2} + 0.5x_{n-1} - x_n + 1 && , \ k = 1 \\
f_k(x) &= -2x_k^2 + 3x_k - x_{k-1} - 2x_{k+1} + 3x_{n-4} - x_{n-3} \\
&- \quad x_{n-2} + 0.5x_{n-1} - x_n + 1 && , \ 1 < k < n \\
f_k(x) &= -2x_k^2 + 3x_k - x_{k-1} + 3x_{n-4} - x_{n-3} \\
&- \quad x_{n-2} + 0.5x_{n-1} - x_n + 1 && , \ k = n \\
\overline{x}_i &= -1, \quad i \geq 1
\end{aligned}
$$

Problem 43. Extended Freudenstein and Roth function [5].

$$
\begin{aligned}
f_k(x) &= x_k + ((5 - x_{k+1})x_{k+1} - 2)x_{k+1} - 13 \ , && \mathrm{mod}(k,2) = 1 \\
f_k(x) &= x_{k-1} + ((x_k + 1)x_k - 14)x_k - 29 \ , && \mathrm{mod}(k,2) = 0 \\
\overline{x}_i &= 90 \ , \ \mathrm{mod}(i,2) = 1, \quad \overline{x}_i = 60 \ , && \mathrm{mod}(i,2) = 0
\end{aligned}
$$

Problem 44. Extended Powell singular problem [24].

$$
\begin{aligned}
f_k(x) &= x_k + 10x_{k+1} \ , && \mathrm{mod}(k,4) = 1 \\
f_k(x) &= \sqrt{5}(x_{k+1} - x_{k+2}) \ , && \mathrm{mod}(k,4) = 2 \\
f_k(x) &= (x_{k-1} - 2x_k)^2 \ , && \mathrm{mod}(k,4) = 3 \\
f_k(x) &= \sqrt{10}(x_{k-3} - x_k)^2 \ , && \mathrm{mod}(k,4) = 0 \\
\overline{x}_i &= 3 \ , \ \mathrm{mod}(i,4) = 1, \quad \overline{x}_i = -1 \ , && \mathrm{mod}(i,4) = 2 \\
\overline{x}_i &= 0 \ , \ \mathrm{mod}(i,4) = 3, \quad \overline{x}_i = 1 \ , && \mathrm{mod}(i,4) = 0
\end{aligned}
$$

Problem 45. Extended Cragg and Levy problem [24].

$$
\begin{aligned}
f_k(x) &= (\exp(x_k) - x_{k+1})^2 \ , && \mathrm{mod}(k,4) = 1 \\
f_k(x) &= 10(x_k - x_{k+1})^3 \ , && \mathrm{mod}(k,4) = 2
\end{aligned}
$$

$$
\begin{aligned}
f_k(x) &= \tan^2(x_k - x_{k+1}) &&, \quad \mathrm{mod}(k,4) = 3 \\
f_k(x) &= x_k - 1 &&, \quad \mathrm{mod}(k,4) = 0 \\
\overline{x}_i &= 1 \ , \ \mathrm{mod}(i,4) = 1, \quad \overline{x}_i = 2 \ , \ \mathrm{mod}(i,4) \neq 1
\end{aligned}
$$

Problem 46. Broyden tridiagonal problem [24].

$$
\begin{aligned}
f_k(x) &= x_k(0.5x_k - 3) + 2x_{k+1} - 1 &&, \ k = 1 \\
f_k(x) &= x_k(0.5x_k - 3) + x_{k-1} + 2x_{k+1} - 1 &&, \ 1 < k < n \\
f_k(x) &= x_k(0.5x_k - 3) - 1 + x_{k-1} &&, \ k = n \\
\overline{x}_i &= -1, \quad i \geq 1
\end{aligned}
$$

Problem 47. Generalized Broyden banded problem [24].

$$
\begin{aligned}
f_k(x) &= (2 + 5x_k^2)x_k + 1 + \sum_{i=k_1}^{k_2} x_i(1 + x_i) \\
k_1 &= \max\,(1, k-5), \quad k_2 = \min\,(n, k+1) \\
\overline{x}_i &= -1, \quad i \geq 1
\end{aligned}
$$

Problem 48. Extended Powell badly scaled function [24].

$$
\begin{aligned}
f_k(x) &= 10000\, x_k\, x_{k+1} - 1 &&, \quad \mathrm{mod}(k,2) = 1 \\
f_k(x) &= \exp(-x_{k-1}) + \exp(-x_k) - 1.0001 &&, \quad \mathrm{mod}(k,2) = 2 \\
\overline{x}_i &= 0 \ , \ \mathrm{mod}(i,2) = 1, \quad \overline{x}_i = 1 \ , \ \mathrm{mod}(i,2) = 0
\end{aligned}
$$

Problem 49. Extended Wood problem [14].

$$
\begin{aligned}
f_k(x) &= -200x_k(x_{k+1} - x_k^2) - (1 - x_k) &&, \quad \mathrm{mod}(k,4) = 1 \\
f_k(x) &= 200(x_k - x_{k-1}^2) + 20(x_k - 1) + 19.8(x_{k+2} - 1) &&, \quad \mathrm{mod}(k,4) = 2 \\
f_k(x) &= -180x_k(x_{k+1} - x_k^2) - (1 - x_k) &&, \quad \mathrm{mod}(k,4) = 3 \\
f_k(x) &= 180(x_k - x_{k-1}^2) + 20.2(x_k - 1) + 19.8(x_{k-2} - 1) &&, \quad \mathrm{mod}(k,4) = 4 \\
\overline{x}_i &= -3, \ \mathrm{mod}(i,2) = 1, \quad \overline{x}_i = -1, \ \mathrm{mod}(i,2) = 0
\end{aligned}
$$

Problem 50. Tridiagonal exponential problem [5].

$$
\begin{aligned}
f_k(x) &= x_k - \exp(\cos(h(x_k + x_{k+1}))) &&, \ k = 1 \\
f_k(x) &= x_k - \exp(\cos(h(x_{k-1} + x_k + x_{k+1}))) &&, \ 1 < k < n \\
f_k(x) &= x_k - \exp(\cos(h(x_{k-1} + x_k))) &&, \ k = n \\
h &= 1/(n+1) \\
\overline{x}_i &= 1.5, \quad i \geq 1
\end{aligned}
$$

Problem 51. Discrete boundary value problem [24].

$$
\begin{aligned}
f_k(x) &= 2x_k + 0.5h^2(x_k + hk)^3 - x_{k+1} &&, \ k = 1 \\
f_k(x) &= 2x_k + 0.5h^2(x_k + hk)^3 - x_{k-1} - x_{k+1} &&, \ 1 < k < n \\
f_k(x) &= 2x_k + 0.5h^2(x_k + hk)^3 - x_{k-1} &&, \ k = n \\
h &= 1/(n+1) \\
\overline{x}_i &= ih(ih - 1), \quad i \geq 1
\end{aligned}
$$

Problem 52. Brent problem [3].

$$\begin{aligned} f_k(x) &= 3x_k(x_{k+1} - 2x_k) + x_{k+1}^2/4 &&, \ k = 1 \\ f_k(x) &= 3x_k(x_{k+1} - 2x_k + x_{k-1}) + (x_{k+1} - x_{k-1})^2/4 &&, \ 1 < k < n \\ f_k(x) &= 3x_k(20 - 2x_k + x_{k-1}) + (20 - x_{k-1})^2/4 &&, \ k = n \\ \overline{x}_i &= 10, \quad i \geq 1 \end{aligned}$$

Problem 53. Troesch problem [25].

$$\begin{aligned} f_k(x) &= 2x_k + \rho h^2 \text{sing}(\rho x_k) - x_{k+1} &&, \ k = 1 \\ f_k(x) &= 2x_k + \rho h^2 \sinh(\rho x_k) - x_{k-1} - x_{k+1} &&, \ 1 < k < n \\ f_k(x) &= 2x_k + \rho h^2 \sinh(\rho x_k) - x_{k-1} - 1 &&, \ k = n \\ \rho &= 10, \quad h \ = \ 1/(n+1) \\ \overline{x}_i &= \ 1, \quad i \geq 1 \end{aligned}$$

Problem 54. Flow in a channel [4].
This is a finite difference analogue of the following nonlinear ordinary differential equation

$$u^{''''} = R(u^{'}u^{''} - uu^{'''}), \quad R = 500$$

over unit interval Ω with boundary conditions $u(0) = 0$, $u^{'}(0) = 0$, $u(1) = 1$, $u^{'}(1) = 0$. We use standard 5-point finite differences on an uniform grid having 5000 internal nodes. The initial approximate solution is a discretization of $u_0(x) = (x - 1/2)^2$.

Problem 55. Swirling flow [4].
This is a finite difference analogue of the following system of two nonlinear ordinary differential equations

$$\begin{aligned} u^{''''} + R(uu^{'''} + vv^{'}) &= 0 \\ v^{''} + R(uv^{'} + u^{'}v) &= 0, \quad R = 500 \end{aligned}$$

over unit interval Ω with boundary conditions $u(0) = u^{'}(0) = u(1) = u^{'}(1) = 0$, $v(0) = -1$, $v(1) = 1$. We use standard 5-point finite differences on an uniform grid having 2500 internal nodes. The initial approximate solution is a discretization of $u_0(x) = (x - 1/2)^2$ and $v_0(x) = x - 1/2$.

Problem 56. Bratu problem [15].
This is a finite difference analogue of the following nonlinear partial differential equation

$$\Delta u + R\exp(u) = 0, \quad R = 6.8$$

over unit square Ω with Dirichlet boundary conditions $u = 0$ on $\partial\Omega$. We use standard 5-point finite differences on a uniform grid having 70×70 internal nodes. The initial approximate solution is a discretization of $u_0(x, y) = 0$.

Problem 57. Poisson problem 1 [12].
This is a finite difference analogue of the following nonlinear partial differential equation

$$\Delta u = \frac{u^3}{1 + x^2 + y^2}$$

over unit square Ω with Dirichlet boundary conditions $u(0,y) = 1$, $u(1,y) = 2 - \exp(y)$, $u(x,0) = 1$, $u(x,1) = 2 - \exp(x)$. We use standard 5-point finite differences on a uniform grid having 70×70 internal nodes. The initial approximate solution is a discretization of $u_0(x,y) = -1$.

Problem 58. Poisson problem 2 [23].
This is a finite difference analogue of the following nonlinear partial differential equation

$$\Delta u + \sin(2\pi u) + \sin\left(2\pi \frac{\partial u}{\partial x}\right) + \sin\left(2\pi \frac{\partial u}{\partial y}\right) + f(x,y) = 0,$$

where $f(x,y) = 1000((x-1/4)^2 + (y-3/4)^2)$, over unit square Ω with Dirichlet boundary conditions $u = 0$ on $\partial\Omega$. We use standard 5-point finite differences on a uniform grid having 70×70 internal nodes. The initial approximate solution is a discretization of $u_0(x,y) = 0$.

Problem 59. Porous medium problem [10].
This is a finite difference analogue of the following nonlinear partial differential equation

$$\Delta u^2 + R\left(\frac{\partial u^3}{\partial x} + f(x,y),\right) = 0, \quad R = 50,$$

where $f(1/71, 1/71) = 1$ and $f(x,y) = 0$ for $(x,y) \neq (1/71, 1/71)$, over unit square Ω with Dirichlet boundary conditions $u(0,y) = 1$, $u(1,y) = 0$, $u(x,0) = 1$, $u(x,1) = 0$. We use standard 5-point finite differences on a uniform grid having 70×70 internal nodes. The initial approximate solution is a discretization of $u_0(x,y) = 1 - xy$.

Problem 60. Convection-difussion problem [16].
This is a finite difference analogue of the following nonlinear partial differential equation

$$\Delta u - Ru\left(\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y}\right) + f(x,y) = 0, \quad R = 20,$$

where $f(x,y) = 2000x(1-x)y(1-y)$, over unit square Ω with Dirichlet boundary conditions $u = 0$ on $\partial\Omega$. We use standard 5-point finite differences on a uniform grid having 70×70 internal nodes. The initial approximate solution is a discretization of $u_0(x,y) = 0$.

Problem 61. Nonlinear biharmonic problem [20].
This is a finite difference analogue of the following nonlinear partial differential equation

$$\Delta\Delta u + R\left(\max(0,u) + \operatorname{sign}(x - \frac{1}{2})\right) = 0, \quad R = 500$$

over unit square Ω with the boundary conditions $u = 0$ on $\partial\Omega$ and $\partial u(0,y)/\partial x = 0$, $\partial u(1,y)/\partial x = 0$, $\partial u(x,0)/\partial y = 0$, $\partial u(x,1)/\partial y = 0$. We use standard 13-point finite differences on a shifted uniform grid having 50×50 internal nodes [15]. The initial approximate solution is a discretization of $u_0(x,y) = 0$.

Problem 62. Driven cavity problem [15].
This is a finite difference analogue of the following nonlinear partial differential equation

$$\Delta\Delta u + R\left(\frac{\partial u}{\partial y}\frac{\partial \Delta u}{\partial x} - \frac{\partial u}{\partial x}\frac{\partial \Delta u}{\partial y}\right) = 0, \quad R = 500$$

over unit square Ω with the boundary conditions $u = 0$ on $\partial\Omega$ and $\partial u(0,y)/\partial x = 0$, $\partial u(1,y)/\partial x = 0$, $\partial u(x,0)/\partial y = 0$, $\partial u(x,1)/\partial y = 1$. We use standard 13-point finite differences on a shifted uniform grid having 50×50 internal nodes [15]. The initial approximate solution is a discretization of $u_0(x,y) = 0$.

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5 Appendix

In the following pages, we give detailed results of numerical experiments. Rows of these pages correspond to individual problems. Each row contains the numbers of iterations (it), function evaluations (nf), Jacobian evaluations (nj), the reached norm (F), the information concerning the termination (inf) and the required computational time. The total values are given in the last row. Summary of the results can be found in tables 1 – 2 in Section 3.

```
Test for subroutine nlls_huangd:     100  variables
------------------------------------------------------------------------------
 1  it=  16  nf=  1651  nj=  16  F= 0.2D-11  G= 0.3D-04  inf=    2  time= 0:00
 2  it=  27  nf=  2884  nj=  27  F= 0.6D-08  G= 0.2D-05  inf=    2  time= 0:01
 3  it=   1  nf=   102  nj=   1  F= 0.1D+12  G= 0.0D+00  inf=   10  time= 0:00
 4  it=   1  nf=   102  nj=   1  F= 0.2D+07  G= 0.0D+00  inf=   10  time= 0:00
 5  it=  25  nf=  2531  nj=  25  F= 0.2D-15  G= 0.3D-06  inf=    2  time= 0:00
 6  it=  54  nf=  5985  nj=  54  F= 0.2D-03  G= 0.4D-02  inf= 1000  time= 0:28
 7  it=   9  nf=   910  nj=   9  F= 0.5D-09  G= 0.2D-03  inf=    2  time= 0:00
 8  it=   1  nf=   102  nj=   1  F= 0.4D-10  G= 0.3D-07  inf=    2  time= 0:00
 9  it=   2  nf=   203  nj=   2  F= 0.1D-13  G= 0.1D-06  inf=    2  time= 0:01
10  it=   3  nf=   304  nj=   3  F= 0.7D-08  G= 0.3D-03  inf=    2  time= 0:00
11  it=  54  nf=  5890  nj=  54  F= 0.5D+02  G= 0.2D+04  inf= 1000  time= 0:01
12  it=  30  nf=  3032  nj=  30  F= 0.1D+03  G= 0.2D+02  inf=   10  time= 0:01
13  it=  10  nf=  1011  nj=  10  F= 0.1D-08  G= 0.1D-05  inf=    2  time= 0:00
14  it=   6  nf=   608  nj=   6  F= 0.1D+02  G= 0.3D+02  inf=   10  time= 0:01
15  it=   4  nf=   405  nj=   4  F= 0.1D-16  G= 0.1D-07  inf=    2  time= 0:00
16  it=   5  nf=   506  nj=   5  F= 0.4D-18  G= 0.3D-08  inf=    2  time= 0:00
17  it=   2  nf=   203  nj=   2  F= 0.5D+05  G= 0.1D+04  inf=   10  time= 0:00
   18          failed due to invalid operation
19  it=  28  nf=  2829  nj=  28  F= 0.4D+03  G= 0.8D-08  inf=    1  time= 0:01
20  it=   2  nf=   206  nj=   2  F= 0.5D+03  G= 0.0D+00  inf=   10  time= 0:00
21  it=  36  nf=  3853  nj=  36  F= 0.7D+02  G= 0.0D+00  inf= 1000  time= 0:01
22  it=   1  nf=   100  nj=   1  F= 0.3D+05  G= 0.0D+00  inf=   10  time= 0:00
23  it=   4  nf=   418  nj=   4  F= 0.3D+05  G= 0.0D+00  inf=   10  time= 0:00
24  it=   1  nf=   102  nj=   1  F= 0.1D+03  G= 0.0D+00  inf=   10  time= 0:00
25  it=   1  nf=   102  nj=   1  F= 0.1D+05  G= 0.0D+00  inf=   10  time= 0:00
26  it=   1  nf=   102  nj=   1  F= 0.1D+04  G= 0.0D+00  inf=   10  time= 0:00
27  it=   3  nf=   324  nj=   3  F= 0.9D+02  G= 0.0D+00  inf=   10  time= 0:00
28  it=   2  nf=   203  nj=   2  F= 0.1D+10  G= 0.1D+09  inf=   10  time= 0:00
29  it=   8  nf=   809  nj=   8  F= 0.7D-09  G= 0.1D-03  inf=    2  time= 0:01
30  it=   5  nf=   511  nj=   5  F= 0.7D-12  G= 0.1D-06  inf=    2  time= 0:00
31  it=  21  nf=  2090  nj=  21  F= 0.1D+03  G= 0.2D+01  inf=   10  time= 0:00
32  it=   8  nf=   815  nj=   8  F= 0.5D+03  G= 0.1D+04  inf=   10  time= 0:01
33  it=   3  nf=   324  nj=   3  F= 0.9D+02  G= 0.0D+00  inf=   10  time= 0:00
34  it=   2  nf=   202  nj=   2  F= 0.1D+02  G= 0.1D+02  inf=   10  time= 0:00
35  it=   2  nf=   203  nj=   2  F= 0.3D-09  G= 0.2D-04  inf=    2  time= 0:00
   36          failed due to invalid operation
37  it=   1  nf=   101  nj=   1  F= 0.8D+03  G= 0.0D+00  inf=   10  time= 0:00
38  it=  14  nf=  1421  nj=  14  F= 0.5D-08  G= 0.2D-05  inf=    2  time= 0:00
39  it=   2  nf=   203  nj=   2  F= 0.1D+10  G= 0.1D+09  inf=   10  time= 0:00
40  it=   1  nf=   102  nj=   1  F= 0.2D+07  G= 0.0D+00  inf=   10  time= 0:00
41  it=   1  nf=   102  nj=   1  F= 0.1D+08  G= 0.0D+00  inf=   10  time= 0:00
42  it=   4  nf=   405  nj=   4  F= 0.8D-11  G= 0.7D-04  inf=    2  time= 0:00
43  it=  11  nf=  1112  nj=  11  F= 0.5D-12  G= 0.3D-04  inf=    2  time= 0:00
44  it=  27  nf=  2884  nj=  27  F= 0.6D-08  G= 0.2D-05  inf=    2  time= 0:01
45  it=  17  nf=  1645  nj=  17  F= 0.5D-08  G= 0.9D-06  inf=    2  time= 0:00
46  it=   3  nf=   304  nj=   3  F= 0.2D-09  G= 0.2D-04  inf=    2  time= 0:00
47  it=   5  nf=   506  nj=   5  F= 0.4D-18  G= 0.3D-08  inf=    2  time= 0:00
48  it=  11  nf=  1112  nj=  11  F= 0.4D-10  G= 0.6D+00  inf=    2  time= 0:00
49  it=  27  nf=  2928  nj=  27  F= 0.3D+01  G= 0.1D+04  inf= 1000  time= 0:01
50  it=   3  nf=   314  nj=   3  F= 0.5D+02  G= 0.0D+00  inf=   10  time= 0:00
51  it=   1  nf=   102  nj=   1  F= 0.4D-10  G= 0.3D-07  inf=    2  time= 0:00
52  it=   2  nf=   207  nj=   2  F= 0.1D+06  G= 0.0D+00  inf=   10  time= 0:00
53  it=  11  nf=  1112  nj=  11  F= 0.3D-13  G= 0.3D-08  inf=    2  time= 0:00
54  it=   1  nf=   102  nj=   1  F= 0.3D+02  G= 0.0D+00  inf=   10  time= 0:00
55  it=   1  nf=   102  nj=   1  F= 0.2D+01  G= 0.0D+00  inf=   10  time= 0:00
56  it=   4  nf=   405  nj=   4  F= 0.1D-09  G= 0.5D-05  inf=    2  time= 0:00
57  it=   3  nf=   304  nj=   3  F= 0.1D-15  G= 0.6D-08  inf=    2  time= 0:00
58  it=  10  nf=  1012  nj=  10  F= 0.4D-12  G= 0.2D-05  inf=    2  time= 0:01
59  it=   7  nf=   708  nj=   7  F= 0.1D-08  G= 0.1D-04  inf=    2  time= 0:00
60  it=   4  nf=   435  nj=   4  F= 0.4D+02  G= 0.0D+00  inf=   10  time= 0:00
61  it=   4  nf=   405  nj=   4  F= 0.9D-08  G= 0.4D-03  inf=    2  time= 0:00
62  it=   1  nf=   102  nj=   1  F= 0.6D+00  G= 0.0D+00  inf=   10  time= 0:00
------------------------------------------------------------------------------
Total  it =   554  nf =   57757  nj =   554      succesful =  29     time= 0:40
```

```
Test for subroutine nlls_huangd:    200  variables
------------------------------------------------------------------------------
 1  it=  16  nf=  3251  nj=  16  F= 0.4D-11  G= 0.4D-04  inf=    2  time= 0:02
 2  it=  28  nf=  5785  nj=  28  F= 0.8D-09  G= 0.5D-06  inf=    2  time= 0:03
 3  it=   1  nf=   202  nj=   1  F= 0.7D+13  G= 0.0D+00  inf=   10  time= 0:01
 4  it=   1  nf=   202  nj=   1  F= 0.5D+14  G= 0.0D+00  inf=   10  time= 0:00
 5  it=   3  nf=   605  nj=   3  F= 0.4D+07  G= 0.3D+10  inf=   10  time= 0:01
    6           failed due to long time
 7  it=   9  nf=  1810  nj=   9  F= 0.1D-08  G= 0.5D-03  inf=    2  time= 0:02
 8  it=   1  nf=   202  nj=   1  F= 0.4D-11  G= 0.3D-08  inf=    2  time= 0:00
 9  it=   2  nf=   403  nj=   2  F= 0.2D-13  G= 0.2D-06  inf=    2  time= 0:02
10  it=   3  nf=   604  nj=   3  F= 0.8D-08  G= 0.3D-03  inf=    2  time= 0:01
   11           failed due to invalid operation
12  it=  30  nf=  6032  nj=  30  F= 0.3D+03  G= 0.1D+02  inf=   10  time= 0:08
13  it=  10  nf=  2011  nj=  10  F= 0.1D-08  G= 0.1D-05  inf=    2  time= 0:01
   14           failed due to invalid operation
15  it=   4  nf=   805  nj=   4  F= 0.2D-16  G= 0.1D-07  inf=    2  time= 0:01
16  it=   5  nf=  1006  nj=   5  F= 0.5D-18  G= 0.4D-08  inf=    2  time= 0:00
17  it=   2  nf=   403  nj=   2  F= 0.1D+06  G= 0.2D+04  inf=   10  time= 0:01
   18           failed due to invalid operation
19  it=  28  nf=  5629  nj=  28  F= 0.9D+03  G= 0.8D-08  inf=    1  time= 0:08
20  it=   2  nf=   413  nj=   2  F= 0.9D+04  G= 0.0D+00  inf=   10  time= 0:00
21  it=  38  nf=  8001  nj=  38  F= 0.2D+03  G= 0.0D+00  inf= 1000  time= 0:07
22  it=   1  nf=   202  nj=   1  F= 0.7D+05  G= 0.0D+00  inf=   10  time= 0:00
23  it=   2  nf=   404  nj=   2  F= 0.6D+05  G= 0.0D+00  inf=   10  time= 0:00
24  it=   1  nf=   202  nj=   1  F= 0.3D+03  G= 0.0D+00  inf=   10  time= 0:01
25  it=   1  nf=   202  nj=   1  F= 0.3D+05  G= 0.0D+00  inf=   10  time= 0:00
26  it=   1  nf=   202  nj=   1  F= 0.3D+04  G= 0.0D+00  inf=   10  time= 0:00
27  it=   1  nf=   202  nj=   1  F= 0.2D+03  G= 0.0D+00  inf=   10  time= 0:01
28  it=   2  nf=   403  nj=   2  F= 0.3D+10  G= 0.2D+09  inf=   10  time= 0:00
29  it=   8  nf=  1609  nj=   8  F= 0.7D-09  G= 0.1D-03  inf=    2  time= 0:01
30  it=   5  nf=  1012  nj=   5  F= 0.1D-10  G= 0.3D-06  inf=    2  time= 0:00
   31           failed due to invalid operation
   32           failed due to invalid operation
33  it=   1  nf=   202  nj=   1  F= 0.2D+03  G= 0.0D+00  inf=   10  time= 0:00
34  it=   2  nf=   403  nj=   2  F= 0.4D+02  G= 0.2D+02  inf=   10  time= 0:01
35  it=   2  nf=   403  nj=   2  F= 0.2D-09  G= 0.2D-04  inf=    2  time= 0:00
   36           failed due to invalid operation
37  it=   1  nf=   201  nj=   1  F= 0.2D+04  G= 0.0D+00  inf=   10  time= 0:00
38  it=  14  nf=  2821  nj=  14  F= 0.9D-08  G= 0.3D-05  inf=    2  time= 0:01
39  it=   2  nf=   403  nj=   2  F= 0.3D+10  G= 0.2D+09  inf=   10  time= 0:01
40  it=   1  nf=   202  nj=   1  F= 0.3D+07  G= 0.0D+00  inf=   10  time= 0:00
41  it=   1  nf=   202  nj=   1  F= 0.2D+08  G= 0.0D+00  inf=   10  time= 0:00
42  it=   4  nf=   805  nj=   4  F= 0.1D-10  G= 0.1D-03  inf=    2  time= 0:00
43  it=  11  nf=  2212  nj=  11  F= 0.1D-11  G= 0.4D-04  inf=    2  time= 0:01
44  it=  28  nf=  5785  nj=  28  F= 0.8D-09  G= 0.5D-06  inf=    2  time= 0:03
45  it=  18  nf=  3471  nj=  18  F= 0.2D-08  G= 0.4D-06  inf=    2  time= 0:02
46  it=   3  nf=   604  nj=   3  F= 0.5D-09  G= 0.3D-04  inf=    2  time= 0:00
47  it=   5  nf=  1006  nj=   5  F= 0.5D-18  G= 0.4D-08  inf=    2  time= 0:01
48  it=  11  nf=  2212  nj=  11  F= 0.9D-10  G= 0.9D+00  inf=    2  time= 0:01
49  it=  27  nf=  5628  nj=  27  F= 0.6D+01  G= 0.1D+04  inf= 1000  time= 0:03
50  it=   3  nf=   612  nj=   3  F= 0.1D+03  G= 0.0D+00  inf=   10  time= 0:00
51  it=   1  nf=   202  nj=   1  F= 0.4D-11  G= 0.3D-08  inf=    2  time= 0:00
52  it=   2  nf=   408  nj=   2  F= 0.2D+06  G= 0.0D+00  inf=   10  time= 0:00
53  it=  10  nf=  2011  nj=  10  F= 0.2D-08  G= 0.2D-06  inf=    2  time= 0:02
54  it=   1  nf=   202  nj=   1  F= 0.1D+02  G= 0.0D+00  inf=   10  time= 0:00
55  it=   1  nf=   202  nj=   1  F= 0.2D+01  G= 0.0D+00  inf=   10  time= 0:00
56  it=   4  nf=   789  nj=   4  F= 0.2D-10  G= 0.2D-05  inf=    2  time= 0:00
57  it=   3  nf=   592  nj=   3  F= 0.5D-16  G= 0.2D-08  inf=    2  time= 0:01
58  it=  10  nf=  1974  nj=  10  F= 0.9D-12  G= 0.4D-05  inf=    2  time= 0:01
59  it=   7  nf=  1380  nj=   7  F= 0.2D-08  G= 0.2D-04  inf=    2  time= 0:01
60  it=  22  nf=  4555  nj=  22  F= 0.2D+02  G= 0.0D+00  inf= 1000  time= 0:03
61  it=   4  nf=   789  nj=   4  F= 0.7D-09  G= 0.8D-04  inf=    2  time= 0:00
62  it=   1  nf=   198  nj=   1  F= 0.4D+00  G= 0.0D+00  inf=   10  time= 0:00
------------------------------------------------------------------------------
Total  it =   405  nf =   82276  nj =   405      succesful =  28     time= 1:03
```

```
Test for subroutine nlls_iqrd:    100  variables
-------------------------------------------------------------------------------
    1  it =    16  nf =    1651  nj =    16  F = 0.2D-11  inf=    2  time= 0:00
    2  it =    27  nf =    2884  nj =    27  F = 0.6D-08  inf=    2  time= 0:01
    3  it =    22  nf =    2426  nj =    22  F = 0.8D+04  inf= 1000  time= 0:00
    4          failed due to invalid operation
    5  it =    25  nf =    2531  nj =    25  F = 0.1D-15  inf=    2  time= 0:01
    6  it =    65  nf =    7206  nj =    65  F = 0.2D-03  inf= 1000  time= 0:28
    7  it =     9  nf =     910  nj =     9  F = 0.5D-09  inf=    2  time= 0:00
    8  it =     1  nf =     102  nj =     1  F = 0.4D-10  inf=    2  time= 0:00
    9  it =     2  nf =     203  nj =     2  F = 0.1D-13  inf=    2  time= 0:00
   10  it =     3  nf =     304  nj =     3  F = 0.7D-08  inf=    2  time= 0:00
   11  it =    54  nf =    5890  nj =    54  F = 0.5D+02  inf= 1000  time= 0:01
   12  it =    33  nf =    3365  nj =    33  F = 0.1D+03  inf=   10  time= 0:02
   13  it =    10  nf =    1011  nj =    10  F = 0.1D-08  inf=    2  time= 0:00
   14          failed due to invalid operation
   15  it =     4  nf =     405  nj =     4  F = 0.1D-16  inf=    2  time= 0:00
   16  it =     5  nf =     506  nj =     5  F = 0.4D-18  inf=    2  time= 0:00
   17  it =    18  nf =    1899  nj =    18  F = 0.1D+05  inf=    1  time= 0:00
   18          failed due to invalid operation
   19  it =    28  nf =    2829  nj =    28  F = 0.4D+03  inf=    1  time= 0:01
   20          failed due to invalid operation
   21  it =    36  nf =    3853  nj =    36  F = 0.7D+02  inf= 1000  time= 0:01
   22  it =    93  nf =   10138  nj =    93  F = 0.3D+05  inf= 1000  time= 0:03
   23  it =   100  nf =   10892  nj =   100  F = 0.3D+05  inf=  100  time= 0:02
   24  it =    23  nf =    2527  nj =    23  F = 0.1D+03  inf= 1000  time= 0:03
   25          failed due to invalid operation
   26  it =    36  nf =    3997  nj =    36  F = 0.1D+04  inf= 1000  time= 0:02
   27  it =    32  nf =    3553  nj =    32  F = 0.9D+02  inf= 1000  time= 0:01
   28  it =    34  nf =    3775  nj =    34  F = 0.1D+11  inf= 1000  time= 0:00
   29  it =     8  nf =     809  nj =     8  F = 0.7D-09  inf=    2  time= 0:00
   30  it =     5  nf =     511  nj =     5  F = 0.7D-12  inf=    2  time= 0:00
   31  it =   100  nf =   10711  nj =   100  F = 0.1D+03  inf=  100  time= 0:03
   32  it =   100  nf =   10982  nj =   100  F = 0.5D+03  inf=  100  time= 0:03
   33  it =    32  nf =    3553  nj =    32  F = 0.9D+02  inf= 1000  time= 0:00
   34  it =    30  nf =    3301  nj =    30  F = 0.1D+02  inf= 1000  time= 0:01
   35  it =     2  nf =     203  nj =     2  F = 0.3D-09  inf=    2  time= 0:00
   36          failed due to invalid operation
   37          failed due to invalid operation
   38  it =    14  nf =    1421  nj =    14  F = 0.5D-08  inf=    2  time= 0:00
   39  it =    34  nf =    3775  nj =    34  F = 0.1D+11  inf= 1000  time= 0:01
   40  it =    36  nf =    3997  nj =    36  F = 0.2D+07  inf= 1000  time= 0:00
   41  it =    30  nf =    3331  nj =    30  F = 0.1D+08  inf= 1000  time= 0:01
   42  it =     4  nf =     405  nj =     4  F = 0.8D-11  inf=    2  time= 0:00
   43  it =    11  nf =    1112  nj =    11  F = 0.5D-12  inf=    2  time= 0:00
   44  it =    27  nf =    2884  nj =    27  F = 0.6D-08  inf=    2  time= 0:00
   45  it =    17  nf =    1645  nj =    17  F = 0.5D-08  inf=    2  time= 0:00
   46  it =     3  nf =     304  nj =     3  F = 0.2D-09  inf=    2  time= 0:00
   47  it =     5  nf =     506  nj =     5  F = 0.4D-18  inf=    2  time= 0:01
   48  it =    11  nf =    1112  nj =    11  F = 0.4D-10  inf=    2  time= 0:00
   49  it =    27  nf =    2928  nj =    27  F = 0.3D+01  inf= 1000  time= 0:00
   50  it =    51  nf =    5539  nj =    51  F = 0.6D+01  inf= 1000  time= 0:01
   51  it =     1  nf =     102  nj =     1  F = 0.4D-10  inf=    2  time= 0:00
   52  it =    45  nf =    4990  nj =    45  F = 0.1D+06  inf= 1000  time= 0:01
   53  it =    11  nf =    1112  nj =    11  F = 0.3D-13  inf=    2  time= 0:00
   54  it =    75  nf =    7834  nj =    75  F = 0.1D+01  inf= 1000  time= 0:01
   55  it =    26  nf =    2887  nj =    26  F = 0.2D+01  inf= 1000  time= 0:00
   56  it =     4  nf =     405  nj =     4  F = 0.1D-09  inf=    2  time= 0:00
   57  it =     3  nf =     304  nj =     3  F = 0.1D-15  inf=    2  time= 0:00
   58  it =     9  nf =     911  nj =     9  F = 0.7D-09  inf=    2  time= 0:01
   59  it =     7  nf =     708  nj =     7  F = 0.1D-08  inf=    2  time= 0:00
   60  it =    30  nf =    3331  nj =    30  F = 0.4D+02  inf= 1000  time= 0:00
   61  it =     4  nf =     405  nj =     4  F = 0.9D-08  inf=    2  time= 0:00
   62  it =    28  nf =    3109  nj =    28  F = 0.6D+00  inf= 1000  time= 0:01
-------------------------------------------------------------------------------
Total  it =  1466  nf =  157984  nj =  1466      succesful =  30     time= 1:01
```

```
Test for subroutine nlls_iqrd:    200  variables
-----------------------------------------------------------------------------
    1  it =    16  nf =    3251  nj =    16  F = 0.4D-11  inf=    2  time= 0:02
    2  it =    28  nf =    5785  nj =    28  F = 0.8D-09  inf=    2  time= 0:03
    3  it =     5  nf =    1037  nj =     5  F = 0.2D+05  inf=   10  time= 0:01
    4          failed due to invalid operation
    5  it =     3  nf =     605  nj =     3  F = 0.4D+07  inf=   10  time= 0:00
    6          failed due to long time
    7  it =     9  nf =    1810  nj =     9  F = 0.1D-08  inf=    2  time= 0:03
    8  it =     1  nf =     202  nj =     1  F = 0.4D-11  inf=    2  time= 0:00
    9  it =     2  nf =     403  nj =     2  F = 0.2D-13  inf=    2  time= 0:02
   10  it =     3  nf =     604  nj =     3  F = 0.8D-08  inf=    2  time= 0:00
   11          failed due to invalid operation
   12          failed due to invalid operation
   13  it =    10  nf =    2011  nj =    10  F = 0.1D-08  inf=    2  time= 0:02
   14          failed due to invalid operation
   15  it =     4  nf =     805  nj =     4  F = 0.2D-16  inf=    2  time= 0:00
   16  it =     5  nf =    1006  nj =     5  F = 0.5D-18  inf=    2  time= 0:00
   17          failed due to invalid operation
   18          failed due to invalid operation
   19  it =    28  nf =    5629  nj =    28  F = 0.9D+03  inf=    1  time= 0:07
   20  it =    21  nf =    4422  nj =    21  F = 0.4D+03  inf= 1000  time= 0:04
   21  it =    44  nf =    9267  nj =    44  F = 0.2D+03  inf= 1000  time= 0:07
   22          failed due to invalid operation
   23  it =     2  nf =     404  nj =     2  F = 0.6D+05  inf=   10  time= 0:01
   24          failed due to invalid operation
   25          failed due to invalid operation
   26  it =    35  nf =    7386  nj =    35  F = 0.3D+04  inf= 1000  time= 0:10
   27  it =    25  nf =    5276  nj =    25  F = 0.2D+03  inf= 1000  time= 0:02
   28  it =    31  nf =    6542  nj =    31  F = 0.3D+11  inf= 1000  time= 0:02
   29  it =     8  nf =    1609  nj =     8  F = 0.7D-09  inf=    2  time= 0:01
   30  it =     5  nf =    1012  nj =     5  F = 0.1D-10  inf=    2  time= 0:01
   31          failed due to invalid operation
   32          failed due to invalid operation
   33  it =    25  nf =    5276  nj =    25  F = 0.2D+03  inf= 1000  time= 0:02
   34  it =    28  nf =    5892  nj =    28  F = 0.4D+02  inf= 1000  time= 0:04
   35  it =     2  nf =     403  nj =     2  F = 0.2D-09  inf=    2  time= 0:00
   36          failed due to invalid operation
   37          failed due to invalid operation
   38  it =    14  nf =    2821  nj =    14  F = 0.9D-08  inf=    2  time= 0:02
   39  it =    31  nf =    6542  nj =    31  F = 0.3D+11  inf= 1000  time= 0:02
   40  it =    24  nf =    5065  nj =    24  F = 0.3D+07  inf= 1000  time= 0:02
   41  it =    21  nf =    4432  nj =    21  F = 0.2D+08  inf= 1000  time= 0:02
   42  it =     4  nf =     805  nj =     4  F = 0.1D-10  inf=    2  time= 0:00
   43  it =    11  nf =    2212  nj =    11  F = 0.1D-11  inf=    2  time= 0:01
   44  it =    28  nf =    5785  nj =    28  F = 0.8D-09  inf=    2  time= 0:02
   45  it =    18  nf =    3471  nj =    18  F = 0.2D-08  inf=    2  time= 0:02
   46  it =     3  nf =     604  nj =     3  F = 0.5D-09  inf=    2  time= 0:00
   47  it =     5  nf =    1006  nj =     5  F = 0.5D-18  inf=    2  time= 0:00
   48  it =    11  nf =    2212  nj =    11  F = 0.9D-10  inf=    2  time= 0:01
   49  it =    27  nf =    5628  nj =    27  F = 0.6D+01  inf= 1000  time= 0:02
   50  it =    65  nf =   13695  nj =    65  F = 0.1D+03  inf= 1000  time= 0:07
   51  it =     1  nf =     202  nj =     1  F = 0.4D-11  inf=    2  time= 0:00
   52  it =    34  nf =    7170  nj =    34  F = 0.2D+06  inf= 1000  time= 0:03
   53  it =    10  nf =    2011  nj =    10  F = 0.2D-08  inf=    2  time= 0:00
   54  it =   100  nf =   20101  nj =   100  F = 0.3D+00  inf=  100  time= 0:09
   55  it =    27  nf =    5698  nj =    27  F = 0.2D+01  inf= 1000  time= 0:04
   56  it =     4  nf =     789  nj =     4  F = 0.2D-10  inf=    2  time= 0:00
   57  it =     3  nf =     592  nj =     3  F = 0.5D-16  inf=    2  time= 0:00
   58  it =    12  nf =    2386  nj =    12  F = 0.6D-10  inf=    2  time= 0:02
   59  it =     7  nf =    1380  nj =     7  F = 0.2D-08  inf=    2  time= 0:01
   60  it =    22  nf =    4555  nj =    22  F = 0.2D+02  inf= 1000  time= 0:02
   61  it =     4  nf =     789  nj =     4  F = 0.7D-09  inf=    2  time= 0:01
   62  it =    31  nf =    6418  nj =    31  F = 0.4D+00  inf= 1000  time= 0:04
-----------------------------------------------------------------------------
Total  it =   857  nf =  177006  nj =   857      succesful =  28     time= 1:43
```

```
Test for subroutine nlls_iqr0d:    100  variables
------------------------------------------------------------------------------
 1  it=  16  nf=  1651  nj=  16  F= 0.2D-11  G= 0.3D-04  inf=    2  time= 0:01
 2  it=  27  nf=  2884  nj=  27  F= 0.6D-08  G= 0.2D-05  inf=    2  time= 0:00
 3  it=  22  nf=  2426  nj=  22  F= 0.8D+04  G= 0.0D+00  inf= 1000  time= 0:01
   4          failed due to invalid operation
 5  it=  25  nf=  2531  nj=  25  F= 0.1D-15  G= 0.3D-06  inf=    2  time= 0:00
 6  it=  76  nf=  8427  nj=  76  F= 0.2D-03  G= 0.4D-02  inf= 1000  time= 0:32
 7  it=   9  nf=   910  nj=   9  F= 0.5D-09  G= 0.2D-03  inf=    2  time= 0:01
 8  it=   1  nf=   102  nj=   1  F= 0.4D-10  G= 0.3D-07  inf=    2  time= 0:00
 9  it=   2  nf=   203  nj=   2  F= 0.1D-13  G= 0.1D-06  inf=    2  time= 0:00
10  it=   3  nf=   304  nj=   3  F= 0.7D-08  G= 0.3D-03  inf=    2  time= 0:00
11  it=  54  nf=  5890  nj=  54  F= 0.5D+02  G= 0.2D+04  inf= 1000  time= 0:02
12  it=  33  nf=  3365  nj=  33  F= 0.1D+03  G= 0.2D+02  inf=   10  time= 0:02
13  it=  10  nf=  1011  nj=  10  F= 0.1D-08  G= 0.1D-05  inf=    2  time= 0:00
  14          failed due to invalid operation
15  it=   4  nf=   405  nj=   4  F= 0.1D-16  G= 0.1D-07  inf=    2  time= 0:00
16  it=   5  nf=   506  nj=   5  F= 0.4D-18  G= 0.3D-08  inf=    2  time= 0:00
17  it=  18  nf=  1899  nj=  18  F= 0.1D+05  G= 0.8D-08  inf=    1  time= 0:01
  18          failed due to invalid operation
19  it=  28  nf=  2829  nj=  28  F= 0.4D+03  G= 0.8D-08  inf=    1  time= 0:02
  20          failed due to invalid operation
21  it=  36  nf=  3853  nj=  36  F= 0.7D+02  G= 0.0D+00  inf= 1000  time= 0:01
22  it=  71  nf=  7740  nj=  71  F= 0.3D+05  G= 0.0D+00  inf= 1000  time= 0:03
23  it= 100  nf= 10892  nj= 100  F= 0.3D+05  G= 0.0D+00  inf=  100  time= 0:04
24  it=  39  nf=  4215  nj=  39  F= 0.1D+03  G= 0.0D+00  inf= 1000  time= 0:06
  25          failed due to invalid operation
26  it=  30  nf=  3331  nj=  30  F= 0.1D+04  G= 0.0D+00  inf= 1000  time= 0:02
27  it=  24  nf=  2665  nj=  24  F= 0.9D+02  G= 0.0D+00  inf= 1000  time= 0:00
28  it=  34  nf=  3775  nj=  34  F= 0.1D+11  G= 0.0D+00  inf= 1000  time= 0:01
29  it=   8  nf=   809  nj=   8  F= 0.7D-09  G= 0.1D-03  inf=    2  time= 0:00
30  it=   5  nf=   511  nj=   5  F= 0.7D-12  G= 0.1D-06  inf=    2  time= 0:00
31  it= 100  nf= 10702  nj= 100  F= 0.6D+02  G= 0.2D+01  inf=  100  time= 0:04
32  it= 100  nf= 11001  nj= 100  F= 0.5D+03  G= 0.1D+04  inf=  100  time= 0:05
33  it=  24  nf=  2665  nj=  24  F= 0.9D+02  G= 0.0D+00  inf= 1000  time= 0:00
34  it=  27  nf=  2972  nj=  27  F= 0.1D+02  G= 0.1D+02  inf= 1000  time= 0:01
35  it=   2  nf=   203  nj=   2  F= 0.3D-09  G= 0.2D-04  inf=    2  time= 0:00
  36          failed due to invalid operation
  37          failed due to invalid operation
38  it=  14  nf=  1421  nj=  14  F= 0.5D-08  G= 0.2D-05  inf=    2  time= 0:00
39  it=  34  nf=  3775  nj=  34  F= 0.1D+11  G= 0.0D+00  inf= 1000  time= 0:01
40  it=  28  nf=  3109  nj=  28  F= 0.2D+07  G= 0.0D+00  inf= 1000  time= 0:00
41  it=  26  nf=  2887  nj=  26  F= 0.1D+08  G= 0.0D+00  inf= 1000  time= 0:01
42  it=   4  nf=   405  nj=   4  F= 0.8D-11  G= 0.7D-04  inf=    2  time= 0:00
43  it=  11  nf=  1112  nj=  11  F= 0.5D-12  G= 0.3D-04  inf=    2  time= 0:00
44  it=  27  nf=  2884  nj=  27  F= 0.6D-08  G= 0.2D-05  inf=    2  time= 0:00
45  it=  17  nf=  1645  nj=  17  F= 0.5D-08  G= 0.9D-06  inf=    2  time= 0:01
46  it=   3  nf=   304  nj=   3  F= 0.2D-09  G= 0.2D-04  inf=    2  time= 0:00
47  it=   5  nf=   506  nj=   5  F= 0.4D-18  G= 0.3D-08  inf=    2  time= 0:00
48  it=  11  nf=  1112  nj=  11  F= 0.4D-10  G= 0.6D+00  inf=    2  time= 0:00
49  it=  27  nf=  2928  nj=  27  F= 0.3D+01  G= 0.1D+04  inf= 1000  time= 0:00
50  it= 100  nf= 10941  nj= 100  F= 0.9D+01  G= 0.0D+00  inf=  100  time= 0:03
51  it=   1  nf=   102  nj=   1  F= 0.4D-10  G= 0.3D-07  inf=    2  time= 0:00
52  it=  47  nf=  5212  nj=  47  F= 0.1D+06  G= 0.0D+00  inf= 1000  time= 0:01
53  it=  11  nf=  1112  nj=  11  F= 0.3D-13  G= 0.3D-08  inf=    2  time= 0:00
54  it=  67  nf=  7030  nj=  67  F= 0.1D+01  G= 0.7D+00  inf= 1000  time= 0:02
55  it=  27  nf=  2998  nj=  27  F= 0.2D+01  G= 0.0D+00  inf= 1000  time= 0:00
56  it=   4  nf=   405  nj=   4  F= 0.1D-09  G= 0.5D-05  inf=    2  time= 0:00
57  it=   3  nf=   304  nj=   3  F= 0.1D-15  G= 0.6D-08  inf=    2  time= 0:00
58  it=  11  nf=  1113  nj=  11  F= 0.3D-08  G= 0.2D-03  inf=    2  time= 0:01
59  it=   7  nf=   708  nj=   7  F= 0.1D-08  G= 0.1D-04  inf=    2  time= 0:00
60  it=  28  nf=  3109  nj=  28  F= 0.4D+02  G= 0.0D+00  inf= 1000  time= 0:00
61  it=   4  nf=   405  nj=   4  F= 0.9D-08  G= 0.4D-03  inf=    2  time= 0:01
62  it=  30  nf=  3331  nj=  30  F= 0.6D+00  G= 0.0D+00  inf= 1000  time= 0:00
------------------------------------------------------------------------------
Total  it =  1480  nf =  159535  nj =  1480      succesful =  30     time= 1:20
```

```
Test for subroutine nlls_iqr0d:    200  variables
------------------------------------------------------------------------------
 1  it=  16  nf=  3251  nj=  16  F= 0.4D-11  G= 0.4D-04  inf=    2  time= 0:01
 2  it=  28  nf=  5785  nj=  28  F= 0.8D-09  G= 0.5D-06  inf=    2  time= 0:04
 3  it=  26  nf=  5478  nj=  26  F= 0.2D+05  G= 0.0D+00  inf= 1000  time= 0:03
    4          failed due to invalid operation
    5          failed due to invalid operation
    6          failed due to long time
 7  it=   9  nf=  1810  nj=   9  F= 0.1D-08  G= 0.5D-03  inf=    2  time= 0:03
 8  it=   1  nf=   202  nj=   1  F= 0.4D-11  G= 0.3D-08  inf=    2  time= 0:00
 9  it=   2  nf=   403  nj=   2  F= 0.2D-13  G= 0.2D-06  inf=    2  time= 0:02
10  it=   3  nf=   604  nj=   3  F= 0.8D-08  G= 0.3D-03  inf=    2  time= 0:00
   11          failed due to invalid operation
   12          failed due to invalid operation
13  it=  10  nf=  2011  nj=  10  F= 0.1D-08  G= 0.1D-05  inf=    2  time= 0:03
   14          failed due to invalid operation
15  it=   4  nf=   805  nj=   4  F= 0.2D-16  G= 0.1D-07  inf=    2  time= 0:00
16  it=   5  nf=  1006  nj=   5  F= 0.5D-18  G= 0.4D-08  inf=    2  time= 0:01
   17          failed due to invalid operation
   18          failed due to invalid operation
19  it=  28  nf=  5629  nj=  28  F= 0.9D+03  G= 0.8D-08  inf=    1  time= 0:13
20  it=  21  nf=  4422  nj=  21  F= 0.4D+03  G= 0.0D+00  inf= 1000  time= 0:07
21  it=  40  nf=  8423  nj=  40  F= 0.2D+03  G= 0.0D+00  inf= 1000  time= 0:11
   22          failed due to invalid operation
23  it=   2  nf=   404  nj=   2  F= 0.6D+05  G= 0.0D+00  inf=   10  time= 0:01
   24          failed due to invalid operation
   25          failed due to invalid operation
26  it=  36  nf=  7597  nj=  36  F= 0.3D+04  G= 0.0D+00  inf= 1000  time= 0:14
27  it=  27  nf=  5698  nj=  27  F= 0.2D+03  G= 0.0D+00  inf= 1000  time= 0:04
28  it=  30  nf=  6331  nj=  30  F= 0.3D+11  G= 0.0D+00  inf= 1000  time= 0:04
29  it=   8  nf=  1609  nj=   8  F= 0.7D-09  G= 0.1D-03  inf=    2  time= 0:01
30  it=   5  nf=  1012  nj=   5  F= 0.1D-10  G= 0.3D-06  inf=    2  time= 0:01
   31          failed due to invalid operation
   32          failed due to invalid operation
33  it=  27  nf=  5698  nj=  27  F= 0.2D+03  G= 0.0D+00  inf= 1000  time= 0:04
34  it=  38  nf=  7997  nj=  38  F= 0.4D+02  G= 0.2D+02  inf= 1000  time= 0:05
35  it=   2  nf=   403  nj=   2  F= 0.2D-09  G= 0.2D-04  inf=    2  time= 0:01
   36          failed due to invalid operation
   37          failed due to invalid operation
38  it=  14  nf=  2821  nj=  14  F= 0.9D-08  G= 0.3D-05  inf=    2  time= 0:02
39  it=  30  nf=  6331  nj=  30  F= 0.3D+11  G= 0.0D+00  inf= 1000  time= 0:04
40  it=  23  nf=  4854  nj=  23  F= 0.3D+07  G= 0.0D+00  inf= 1000  time= 0:03
41  it=  23  nf=  4854  nj=  23  F= 0.2D+08  G= 0.0D+00  inf= 1000  time= 0:04
42  it=   4  nf=   805  nj=   4  F= 0.1D-10  G= 0.1D-03  inf=    2  time= 0:00
43  it=  11  nf=  2212  nj=  11  F= 0.1D-11  G= 0.4D-04  inf=    2  time= 0:01
44  it=  28  nf=  5785  nj=  28  F= 0.8D-09  G= 0.5D-06  inf=    2  time= 0:02
45  it=  18  nf=  3471  nj=  18  F= 0.2D-08  G= 0.4D-06  inf=    2  time= 0:02
46  it=   3  nf=   604  nj=   3  F= 0.5D-09  G= 0.3D-04  inf=    2  time= 0:00
47  it=   5  nf=  1006  nj=   5  F= 0.5D-18  G= 0.4D-08  inf=    2  time= 0:01
48  it=  11  nf=  2212  nj=  11  F= 0.9D-10  G= 0.9D+00  inf=    2  time= 0:01
49  it=  27  nf=  5628  nj=  27  F= 0.6D+01  G= 0.1D+04  inf= 1000  time= 0:02
50  it=  98  nf= 20580  nj=  98  F= 0.6D+02  G= 0.0D+00  inf= 1000  time= 0:16
51  it=   1  nf=   202  nj=   1  F= 0.4D-11  G= 0.3D-08  inf=    2  time= 0:00
52  it=  41  nf=  8647  nj=  41  F= 0.2D+06  G= 0.0D+00  inf= 1000  time= 0:06
53  it=  10  nf=  2011  nj=  10  F= 0.2D-08  G= 0.2D-06  inf=    2  time= 0:02
54  it= 100  nf= 20101  nj= 100  F= 0.4D+00  G= 0.4D+00  inf=  100  time= 0:15
55  it=  22  nf=  4643  nj=  22  F= 0.2D+01  G= 0.0D+00  inf= 1000  time= 0:03
56  it=   4  nf=   789  nj=   4  F= 0.2D-10  G= 0.2D-05  inf=    2  time= 0:01
57  it=   3  nf=   592  nj=   3  F= 0.5D-16  G= 0.2D-08  inf=    2  time= 0:00
58  it=  10  nf=  1982  nj=  10  F= 0.7D-09  G= 0.1D-03  inf=    2  time= 0:02
59  it=   7  nf=  1380  nj=   7  F= 0.2D-08  G= 0.2D-04  inf=    2  time= 0:01
60  it=  22  nf=  4555  nj=  22  F= 0.2D+02  G= 0.0D+00  inf= 1000  time= 0:03
61  it=   4  nf=   789  nj=   4  F= 0.7D-09  G= 0.8D-04  inf=    2  time= 0:01
62  it=  23  nf=  4762  nj=  23  F= 0.4D+00  G= 0.0D+00  inf= 1000  time= 0:03
------------------------------------------------------------------------------
Total  it =   910  nf =  188194  nj =   910      succesful =  28     time= 2:38
```

```
Test for subroutine lmder:    100  variables
------------------------------------------------------------------------------
    1  it =    16  nf =     21  nj =    15  F = 0.2D-14  inf=    1  time= 0:00
    2  it =    18  nf =     18  nj =    17  F = 0.7D-09  inf=    1  time= 0:01
    3  it =   176  nf =    211  nj =   175  F = 0.3D-02  inf=    1  time= 0:05
    4  it =    44  nf =     55  nj =    43  F = 0.1D+03  inf=    1  time= 0:03
    5  it =    26  nf =     26  nj =    25  F = 0.6D-09  inf=    1  time= 0:00
    6  it =    24  nf =     37  nj =    23  F = 0.3D-03  inf=    1  time= 0:01
    7  it =     2  nf =      2  nj =     2  F = 0.1D+01  inf=    4  time= 0:00
    8  it =     3  nf =      3  nj =     2  F = 0.2D-09  inf=    1  time= 0:00
    9  it =     4  nf =      4  nj =     3  F = 0.3D-14  inf=    1  time= 0:00
   10  it =     5  nf =      5  nj =     4  F = 0.8D-09  inf=    1  time= 0:01
   11  it =   126  nf =    130  nj =   125  F = 0.2D-13  inf=    1  time= 0:04
   12  it =    76  nf =     91  nj =    75  F = 0.4D-08  inf=    1  time= 0:04
   13  it =    17  nf =     17  nj =    16  F = 0.3D-08  inf=    1  time= 0:01
   14  it =    33  nf =     33  nj =    32  F = 0.6D+00  inf=    1  time= 0:01
   15  it =     6  nf =      6  nj =     5  F = 0.5D-15  inf=    1  time= 0:00
   16  it =     6  nf =      6  nj =     5  F = 0.9D-09  inf=    1  time= 0:00
   17  it =    10  nf =     14  nj =     9  F = 0.1D+02  inf=    1  time= 0:00
   18  it =    30  nf =     36  nj =    29  F = 0.3D-08  inf=    1  time= 0:03
   19  it =    32  nf =     32  nj =    31  F = 0.2D+01  inf=    1  time= 0:02
   20  it =    10  nf =     19  nj =     9  F = 0.7D+00  inf=    1  time= 0:00
   21  it =   285  nf =    294  nj =   284  F = 0.3D-09  inf=    1  time= 0:10
   22  it =    23  nf =     32  nj =    22  F = 0.1D+02  inf=    1  time= 0:01
   23  it =    26  nf =     37  nj =    25  F = 0.2D+02  inf=    1  time= 0:02
   24  it =     6  nf =     12  nj =     5  F = 0.5D+00  inf=    1  time= 0:00
   25  it =     6  nf =      6  nj =     5  F = 0.3D+00  inf=    1  time= 0:00
   26  it =    15  nf =     25  nj =    15  F = 0.8D-01  inf=    1  time= 0:01
   27  it =    11  nf =     13  nj =    10  F = 0.2D-08  inf=    1  time= 0:00
   28  it =   855  nf =    961  nj =   854  F = 0.6D-08  inf=    1  time= 0:19
   29  it =    14  nf =     14  nj =    13  F = 0.4D-08  inf=    1  time= 0:01
   30  it =    10  nf =     12  nj =     9  F = 0.1D-10  inf=    1  time= 0:00
   31  it =    20  nf =     21  nj =    19  F = 0.1D+01  inf=    1  time= 0:00
   32  it =   123  nf =    141  nj =   122  F = 0.3D+01  inf=    1  time= 0:06
   33  it =    11  nf =     13  nj =    10  F = 0.2D-08  inf=    1  time= 0:00
   34  it =    18  nf =     27  nj =    17  F = 0.2D-01  inf=    1  time= 0:00
   35  it =     4  nf =      4  nj =     3  F = 0.7D-10  inf=    1  time= 0:00
   36  it =    10  nf =     13  nj =     9  F = 0.2D-10  inf=    1  time= 0:01
   37  it =   976  nf =   1000  nj =   975  F = 0.5D+01  inf=    5  time= 0:24
   38  it =    17  nf =     17  nj =    16  F = 0.3D-08  inf=    1  time= 0:00
   39  it =   313  nf =    382  nj =   312  F = 0.3D-08  inf=    1  time= 0:08
   40  it =    18  nf =     22  nj =    17  F = 0.2D-11  inf=    1  time= 0:00
   41  it =    43  nf =     56  nj =    42  F = 0.7D+00  inf=    1  time= 0:01
   42  it =     6  nf =      6  nj =     5  F = 0.8D-13  inf=    1  time= 0:00
   43  it =    20  nf =     20  nj =    19  F = 0.0D+00  inf=    1  time= 0:01
   44  it =    18  nf =     18  nj =    17  F = 0.7D-09  inf=    1  time= 0:00
   45  it =    20  nf =     21  nj =    19  F = 0.7D-09  inf=    1  time= 0:00
   46  it =     5  nf =      5  nj =     4  F = 0.2D-11  inf=    1  time= 0:00
   47  it =     6  nf =      6  nj =     5  F = 0.9D-09  inf=    1  time= 0:01
   48  it =    17  nf =     18  nj =    16  F = 0.1D-14  inf=    1  time= 0:00
   49  it =    26  nf =     30  nj =    25  F = 0.3D-11  inf=    1  time= 0:00
   50  it =    23  nf =     25  nj =    22  F = 0.3D-11  inf=    1  time= 0:01
   51  it =     3  nf =      3  nj =     2  F = 0.2D-09  inf=    1  time= 0:00
   52  it =    12  nf =     14  nj =    11  F = 0.3D-12  inf=    1  time= 0:00
   53  it =    14  nf =     14  nj =    13  F = 0.5D-15  inf=    1  time= 0:01
   54  it =    84  nf =    117  nj =    83  F = 0.6D-01  inf=    1  time= 0:03
   55  it =    37  nf =     48  nj =    36  F = 0.3D-10  inf=    1  time= 0:02
   56  it =    11  nf =     18  nj =    11  F = 0.2D-03  inf=    1  time= 0:00
   57  it =     5  nf =      5  nj =     4  F = 0.1D-14  inf=    1  time= 0:00
   58  it =    14  nf =     14  nj =    13  F = 0.2D-10  inf=    1  time= 0:01
   59  it =     9  nf =      9  nj =     8  F = 0.5D-10  inf=    1  time= 0:00
   60  it =    11  nf =     15  nj =    10  F = 0.8D-12  inf=    1  time= 0:00
   61  it =    16  nf =     16  nj =    15  F = 0.1D-08  inf=    1  time= 0:00
   62  it =    27  nf =     34  nj =    26  F = 0.1D-08  inf=    1  time= 0:01
------------------------------------------------------------------------------
Total  it =  3852  nf =   4324  nj =  3793      succesful =  61     time= 1:51
```

```
Test for subroutine lmder:    200  variables
------------------------------------------------------------------------------
    1  it =    16  nf =     21  nj =    15  F = 0.2D-14  inf=    1  time= 0:02
    2  it =    18  nf =     18  nj =    17  F = 0.7D-09  inf=    1  time= 0:02
    3  it =    99  nf =    118  nj =    98  F = 0.3D-02  inf=    1  time= 0:19
    4  it =     8  nf =     11  nj =     7  F = 0.3D+07  inf=    1  time= 0:03
    5  it =    32  nf =     32  nj =    31  F = 0.0D+00  inf=    1  time= 0:04
    6  it =    39  nf =     57  nj =    38  F = 0.2D-03  inf=    1  time= 0:10
    7  it =     2  nf =      2  nj =     2  F = 0.1D+01  inf=    4  time= 0:00
    8  it =     3  nf =      3  nj =     2  F = 0.5D-10  inf=    1  time= 0:00
    9  it =     4  nf =      4  nj =     3  F = 0.3D-14  inf=    1  time= 0:01
   10  it =     5  nf =      5  nj =     4  F = 0.8D-09  inf=    1  time= 0:00
   11  it =   236  nf =    242  nj =   235  F = 0.4D-14  inf=    1  time= 1:01
   12  it =   152  nf =    192  nj =   151  F = 0.2D-14  inf=    1  time= 1:03
   13  it =    17  nf =     17  nj =    16  F = 0.3D-08  inf=    1  time= 0:04
   14  it =    30  nf =     33  nj =    29  F = 0.6D+00  inf=    1  time= 0:09
   15  it =     6  nf =      6  nj =     5  F = 0.5D-15  inf=    1  time= 0:01
   16  it =     6  nf =      6  nj =     5  F = 0.9D-09  inf=    1  time= 0:00
   17  it =     8  nf =     12  nj =     7  F = 0.1D+02  inf=    1  time= 0:02
   18  it =    30  nf =     36  nj =    29  F = 0.2D-08  inf=    1  time= 0:23
   19  it =    24  nf =     24  nj =    23  F = 0.2D+01  inf=    1  time= 0:09
   20  it =    15  nf =     26  nj =    14  F = 0.7D+00  inf=    1  time= 0:05
   21  it =   554  nf =    563  nj =   553  F = 0.5D-10  inf=    1  time= 2:22
   22  it =    23  nf =     31  nj =    22  F = 0.1D+02  inf=    1  time= 0:08
   23  it =    24  nf =     37  nj =    23  F = 0.2D+02  inf=    1  time= 0:08
   24  it =     5  nf =     11  nj =     5  F = 0.5D+00  inf=    1  time= 0:02
   25  it =     6  nf =      6  nj =     5  F = 0.3D+00  inf=    1  time= 0:01
   26  it =    13  nf =     22  nj =    12  F = 0.8D-01  inf=    1  time= 0:05
   27  it =    11  nf =     13  nj =    10  F = 0.1D-09  inf=    1  time= 0:02
   28  it =    20  nf =     20  nj =    19  F = 0.1D-10  inf=    1  time= 0:02
   29  it =    14  nf =     14  nj =    13  F = 0.4D-08  inf=    1  time= 0:01
   30  it =    13  nf =     16  nj =    12  F = 0.2D-12  inf=    1  time= 0:02
   31  it =    19  nf =     20  nj =    18  F = 0.1D+01  inf=    1  time= 0:06
   32  it =   122  nf =    141  nj =   121  F = 0.3D+01  inf=    1  time= 0:35
   33  it =    11  nf =     13  nj =    10  F = 0.1D-09  inf=    1  time= 0:01
   34  it =    24  nf =     33  nj =    23  F = 0.2D-01  inf=    1  time= 0:05
   35  it =     4  nf =      4  nj =     3  F = 0.1D-09  inf=    1  time= 0:00
   36  it =    14  nf =     19  nj =    13  F = 0.3D-14  inf=    1  time= 0:02
   37  it =   973  nf =   1000  nj =   972  F = 0.5D+01  inf=    5  time= 2:25
   38  it =    17  nf =     17  nj =    16  F = 0.3D-08  inf=    1  time= 0:02
   39  it =   383  nf =    464  nj =   382  F = 0.2D-14  inf=    1  time= 0:54
   40  it =    21  nf =     27  nj =    20  F = 0.9D-09  inf=    1  time= 0:04
   41  it =    44  nf =     53  nj =    43  F = 0.3D-08  inf=    1  time= 0:07
   42  it =     6  nf =      6  nj =     5  F = 0.8D-13  inf=    1  time= 0:01
   43  it =    20  nf =     20  nj =    19  F = 0.3D-12  inf=    1  time= 0:02
   44  it =    18  nf =     18  nj =    17  F = 0.8D-09  inf=    1  time= 0:02
   45  it =    20  nf =     21  nj =    19  F = 0.7D-09  inf=    1  time= 0:02
   46  it =     5  nf =      5  nj =     4  F = 0.2D-11  inf=    1  time= 0:00
   47  it =     6  nf =      6  nj =     5  F = 0.9D-09  inf=    1  time= 0:01
   48  it =    17  nf =     18  nj =    16  F = 0.1D-14  inf=    1  time= 0:02
   49  it =    21  nf =     23  nj =    20  F = 0.1D-09  inf=    1  time= 0:03
   50  it =    17  nf =     17  nj =    16  F = 0.4D-08  inf=    1  time= 0:02
   51  it =     3  nf =      3  nj =     2  F = 0.5D-10  inf=    1  time= 0:01
   52  it =    24  nf =     29  nj =    23  F = 0.7D-08  inf=    1  time= 0:04
   53  it =    13  nf =     13  nj =    12  F = 0.6D-09  inf=    1  time= 0:01
   54  it =    80  nf =    112  nj =    80  F = 0.1D-01  inf=    1  time= 0:21
   55  it =   186  nf =    222  nj =   185  F = 0.6D-10  inf=    1  time= 0:33
   56  it =     9  nf =      9  nj =     8  F = 0.2D-09  inf=    1  time= 0:00
   57  it =     5  nf =      5  nj =     4  F = 0.8D-15  inf=    1  time= 0:01
   58  it =    14  nf =     14  nj =    13  F = 0.2D-12  inf=    1  time= 0:02
   59  it =     9  nf =      9  nj =     8  F = 0.8D-10  inf=    1  time= 0:00
   60  it =    12  nf =     15  nj =    11  F = 0.7D-14  inf=    1  time= 0:02
   61  it =    15  nf =     15  nj =    14  F = 0.1D-08  inf=    1  time= 0:01
   62  it =    29  nf =     37  nj =    28  F = 0.9D-12  inf=    1  time= 0:06
------------------------------------------------------------------------------
Total  it =  3594  nf =   4006  nj =  3535      succesful =  61     time=12:19
```

```
Test for subroutine lmstr:    100  variables
------------------------------------------------------------------------------
   1  it =   16  nf =    21  nj =   15  F = 0.0D+00  inf=   1  time= 0:00
   2  it =   18  nf =    18  nj =   17  F = 0.7D-09  inf=   1  time= 0:00
   3  it =  175  nf =   206  nj =  175  F = 0.3D-02  inf=   1  time= 0:05
   4  it =   44  nf =    55  nj =   43  F = 0.1D+03  inf=   1  time= 0:03
   5  it =   26  nf =    26  nj =   25  F = 0.6D-09  inf=   1  time= 0:00
   6  it =   24  nf =    37  nj =   23  F = 0.3D-03  inf=   1  time= 0:01
   7  it =    2  nf =     2  nj =    2  F = 0.1D+01  inf=   4  time= 0:00
   8  it =    3  nf =     3  nj =    2  F = 0.2D-09  inf=   1  time= 0:00
   9  it =    4  nf =     4  nj =    3  F = 0.3D-14  inf=   1  time= 0:00
  10  it =    5  nf =     5  nj =    4  F = 0.8D-09  inf=   1  time= 0:00
  11  it =  126  nf =   130  nj =  125  F = 0.2D-13  inf=   1  time= 0:05
  12  it =   76  nf =    91  nj =   75  F = 0.4D-08  inf=   1  time= 0:04
  13  it =   17  nf =    17  nj =   16  F = 0.3D-08  inf=   1  time= 0:00
  14  it =   33  nf =    33  nj =   32  F = 0.6D+00  inf=   1  time= 0:02
  15  it =    6  nf =     6  nj =    5  F = 0.5D-15  inf=   1  time= 0:00
  16  it =    6  nf =     6  nj =    5  F = 0.9D-09  inf=   1  time= 0:00
  17  it =   10  nf =    14  nj =    9  F = 0.1D+02  inf=   1  time= 0:00
  18  it =   30  nf =    36  nj =   29  F = 0.3D-08  inf=   1  time= 0:03
  19  it =   32  nf =    32  nj =   31  F = 0.2D+01  inf=   1  time= 0:01
  20  it =   10  nf =    19  nj =    9  F = 0.7D+00  inf=   1  time= 0:01
  21  it =  285  nf =   294  nj =  284  F = 0.3D-09  inf=   1  time= 0:10
  22  it =   23  nf =    32  nj =   22  F = 0.1D+02  inf=   1  time= 0:01
  23  it =   26  nf =    37  nj =   25  F = 0.2D+02  inf=   1  time= 0:01
  24  it =    5  nf =    11  nj =    5  F = 0.5D+00  inf=   1  time= 0:00
  25  it =    6  nf =     6  nj =    5  F = 0.3D+00  inf=   1  time= 0:01
  26  it =   15  nf =    26  nj =   15  F = 0.8D-01  inf=   1  time= 0:00
  27  it =   11  nf =    13  nj =   10  F = 0.2D-08  inf=   1  time= 0:01
  28  it =  855  nf =   960  nj =  854  F = 0.9D-14  inf=   1  time= 0:20
  29  it =   14  nf =    14  nj =   13  F = 0.4D-08  inf=   1  time= 0:00
  30  it =   10  nf =    12  nj =    9  F = 0.1D-10  inf=   1  time= 0:00
  31  it =   20  nf =    21  nj =   19  F = 0.1D+01  inf=   1  time= 0:01
  32  it =  123  nf =   141  nj =  122  F = 0.3D+01  inf=   1  time= 0:05
  33  it =   11  nf =    13  nj =   10  F = 0.2D-08  inf=   1  time= 0:00
  34  it =   18  nf =    27  nj =   17  F = 0.2D-01  inf=   1  time= 0:01
  35  it =    4  nf =     4  nj =    3  F = 0.7D-10  inf=   1  time= 0:00
  36  it =   10  nf =    13  nj =    9  F = 0.2D-10  inf=   1  time= 0:00
  37  it =  982  nf =  1000  nj =  981  F = 0.5D+01  inf=   5  time= 0:23
  38  it =   17  nf =    17  nj =   16  F = 0.3D-08  inf=   1  time= 0:01
  39  it =  313  nf =   382  nj =  312  F = 0.3D-08  inf=   1  time= 0:07
  40  it =   18  nf =    22  nj =   17  F = 0.2D-11  inf=   1  time= 0:01
  41  it =   43  nf =    56  nj =   42  F = 0.7D+00  inf=   1  time= 0:01
  42  it =    6  nf =     6  nj =    5  F = 0.8D-13  inf=   1  time= 0:00
  43  it =   20  nf =    20  nj =   19  F = 0.0D+00  inf=   1  time= 0:00
  44  it =   18  nf =    18  nj =   17  F = 0.7D-09  inf=   1  time= 0:01
  45  it =   20  nf =    21  nj =   19  F = 0.7D-09  inf=   1  time= 0:00
  46  it =    5  nf =     5  nj =    4  F = 0.2D-11  inf=   1  time= 0:00
  47  it =    6  nf =     6  nj =    5  F = 0.9D-09  inf=   1  time= 0:00
  48  it =   17  nf =    18  nj =   16  F = 0.1D-14  inf=   1  time= 0:00
  49  it =   26  nf =    30  nj =   25  F = 0.3D-11  inf=   1  time= 0:01
  50  it =   23  nf =    25  nj =   22  F = 0.3D-11  inf=   1  time= 0:01
  51  it =    3  nf =     3  nj =    2  F = 0.2D-09  inf=   1  time= 0:00
  52  it =   12  nf =    14  nj =   11  F = 0.3D-12  inf=   1  time= 0:00
  53  it =   14  nf =    14  nj =   13  F = 0.5D-15  inf=   1  time= 0:00
  54  it =   83  nf =   117  nj =   83  F = 0.6D-01  inf=   1  time= 0:04
  55  it =   62  nf =    77  nj =   61  F = 0.6D-12  inf=   1  time= 0:02
  56  it =   11  nf =    18  nj =   11  F = 0.2D-03  inf=   1  time= 0:00
  57  it =    5  nf =     5  nj =    4  F = 0.1D-14  inf=   1  time= 0:00
  58  it =   14  nf =    14  nj =   13  F = 0.7D-11  inf=   1  time= 0:00
  59  it =    9  nf =     9  nj =    8  F = 0.5D-10  inf=   1  time= 0:00
  60  it =   11  nf =    15  nj =   10  F = 0.8D-12  inf=   1  time= 0:01
  61  it =   16  nf =    16  nj =   15  F = 0.1D-08  inf=   1  time= 0:00
  62  it =   27  nf =    34  nj =   26  F = 0.1D-08  inf=   1  time= 0:01
------------------------------------------------------------------------------
Total  it = 3880  nf =  4347  nj = 3824      succesful =  61     time= 1:50
```

```
Test for subroutine lmstr:    200  variables
------------------------------------------------------------------------------
    1  it =    16  nf =     21  nj =    15  F = 0.0D+00  inf=    1  time= 0:02
    2  it =    18  nf =     18  nj =    17  F = 0.7D-09  inf=    1  time= 0:02
    3  it =   101  nf =    121  nj =   100  F = 0.3D-02  inf=    1  time= 0:21
    4  it =     8  nf =     11  nj =     7  F = 0.3D+07  inf=    1  time= 0:03
    5  it =    32  nf =     32  nj =    31  F = 0.0D+00  inf=    1  time= 0:05
    6  it =    39  nf =     57  nj =    38  F = 0.2D-03  inf=    1  time= 0:11
    7  it =     2  nf =      2  nj =     2  F = 0.1D+01  inf=    4  time= 0:00
    8  it =     3  nf =      3  nj =     2  F = 0.5D-10  inf=    1  time= 0:00
    9  it =     4  nf =      4  nj =     3  F = 0.3D-14  inf=    1  time= 0:01
   10  it =     5  nf =      5  nj =     4  F = 0.8D-09  inf=    1  time= 0:00
   11  it =   236  nf =    242  nj =   235  F = 0.4D-14  inf=    1  time= 1:07
   12  it =   152  nf =    192  nj =   151  F = 0.2D-14  inf=    1  time= 1:00
   13  it =    17  nf =     17  nj =    16  F = 0.3D-08  inf=    1  time= 0:04
   14  it =    30  nf =     33  nj =    29  F = 0.6D+00  inf=    1  time= 0:10
   15  it =     6  nf =      6  nj =     5  F = 0.5D-15  inf=    1  time= 0:01
   16  it =     6  nf =      6  nj =     5  F = 0.9D-09  inf=    1  time= 0:00
   17  it =     8  nf =     12  nj =     7  F = 0.1D+02  inf=    1  time= 0:03
   18  it =    30  nf =     36  nj =    29  F = 0.2D-08  inf=    1  time= 0:19
   19  it =    24  nf =     24  nj =    23  F = 0.2D+01  inf=    1  time= 0:08
   20  it =    15  nf =     26  nj =    14  F = 0.7D+00  inf=    1  time= 0:06
   21  it =   554  nf =    563  nj =   553  F = 0.5D-10  inf=    1  time= 2:31
   22  it =    23  nf =     31  nj =    22  F = 0.1D+02  inf=    1  time= 0:08
   23  it =    24  nf =     37  nj =    23  F = 0.2D+02  inf=    1  time= 0:08
   24  it =     5  nf =     11  nj =     5  F = 0.5D+00  inf=    1  time= 0:02
   25  it =     6  nf =      6  nj =     5  F = 0.3D+00  inf=    1  time= 0:02
   26  it =    18  nf =     28  nj =    17  F = 0.8D-01  inf=    1  time= 0:08
   27  it =    11  nf =     13  nj =    10  F = 0.1D-09  inf=    1  time= 0:01
   28  it =    20  nf =     20  nj =    19  F = 0.1D-10  inf=    1  time= 0:03
   29  it =    14  nf =     14  nj =    13  F = 0.4D-08  inf=    1  time= 0:02
   30  it =    13  nf =     16  nj =    12  F = 0.2D-12  inf=    1  time= 0:02
   31  it =    19  nf =     20  nj =    18  F = 0.1D+01  inf=    1  time= 0:06
   32  it =   127  nf =    150  nj =   126  F = 0.3D+01  inf=    1  time= 0:37
   33  it =    11  nf =     13  nj =    10  F = 0.1D-09  inf=    1  time= 0:02
   34  it =    24  nf =     33  nj =    23  F = 0.2D-01  inf=    1  time= 0:05
   35  it =     4  nf =      4  nj =     3  F = 0.1D-09  inf=    1  time= 0:01
   36  it =    14  nf =     19  nj =    13  F = 0.3D-14  inf=    1  time= 0:02
   37  it =   985  nf =   1000  nj =   984  F = 0.5D+01  inf=    5  time= 2:46
   38  it =    17  nf =     17  nj =    16  F = 0.3D-08  inf=    1  time= 0:02
   39  it =   383  nf =    464  nj =   382  F = 0.2D-14  inf=    1  time= 1:07
   40  it =    21  nf =     27  nj =    20  F = 0.9D-09  inf=    1  time= 0:04
   41  it =    44  nf =     53  nj =    43  F = 0.3D-08  inf=    1  time= 0:08
   42  it =     6  nf =      6  nj =     5  F = 0.8D-13  inf=    1  time= 0:01
   43  it =    20  nf =     20  nj =    19  F = 0.3D-12  inf=    1  time= 0:02
   44  it =    18  nf =     18  nj =    17  F = 0.8D-09  inf=    1  time= 0:03
   45  it =    20  nf =     21  nj =    19  F = 0.7D-09  inf=    1  time= 0:02
   46  it =     5  nf =      5  nj =     4  F = 0.2D-11  inf=    1  time= 0:01
   47  it =     6  nf =      6  nj =     5  F = 0.9D-09  inf=    1  time= 0:00
   48  it =    17  nf =     18  nj =    16  F = 0.1D-14  inf=    1  time= 0:02
   49  it =    21  nf =     23  nj =    20  F = 0.1D-09  inf=    1  time= 0:03
   50  it =    17  nf =     17  nj =    16  F = 0.4D-08  inf=    1  time= 0:03
   51  it =     3  nf =      3  nj =     2  F = 0.5D-10  inf=    1  time= 0:00
   52  it =    24  nf =     29  nj =    23  F = 0.7D-08  inf=    1  time= 0:05
   53  it =    13  nf =     13  nj =    12  F = 0.6D-09  inf=    1  time= 0:02
   54  it =    81  nf =    113  nj =    81  F = 0.1D-01  inf=    1  time= 0:23
   55  it =   136  nf =    161  nj =   135  F = 0.3D-12  inf=    1  time= 0:28
   56  it =     9  nf =      9  nj =     8  F = 0.2D-09  inf=    1  time= 0:01
   57  it =     5  nf =      5  nj =     4  F = 0.9D-15  inf=    1  time= 0:00
   58  it =    14  nf =     14  nj =    13  F = 0.1D-12  inf=    1  time= 0:02
   59  it =     9  nf =      9  nj =     8  F = 0.8D-10  inf=    1  time= 0:01
   60  it =    12  nf =     15  nj =    11  F = 0.7D-14  inf=    1  time= 0:02
   61  it =    15  nf =     15  nj =    14  F = 0.1D-08  inf=    1  time= 0:02
   62  it =    29  nf =     37  nj =    28  F = 0.9D-12  inf=    1  time= 0:06
------------------------------------------------------------------------------
Total  it =  3569  nf =   3964  nj =  3510      succesful =  61     time=13:19
```

```
Test for subroutine lmdif:    100  variables
------------------------------------------------------------------------------
    1  it =    16  nf =    1521  nj =     0  F = 0.2D-09  inf=    1  time= 0:00
    2  it =    18  nf =    1718  nj =     0  F = 0.7D-09  inf=    1  time= 0:01
    3  it =   180  nf =   18113  nj =     0  F = 0.3D-02  inf=    1  time= 0:05
    4  it =    48  nf =    4760  nj =     0  F = 0.1D+03  inf=    1  time= 0:03
    5  it =    26  nf =    2526  nj =     0  F = 0.6D-09  inf=    1  time= 0:01
    6  it =    36  nf =    3550  nj =     0  F = 0.3D-03  inf=    1  time= 0:08
    7  it =    11  nf =    1011  nj =     0  F = 0.9D-10  inf=    1  time= 0:00
    8  it =     3  nf =     203  nj =     0  F = 0.2D-09  inf=    1  time= 0:00
    9  it =     4  nf =     304  nj =     0  F = 0.8D-13  inf=    1  time= 0:01
   10  it =     5  nf =     405  nj =     0  F = 0.8D-09  inf=    1  time= 0:00
   11  it =   126  nf =   12630  nj =     0  F = 0.3D-13  inf=    1  time= 0:05
   12  it =    76  nf =    7591  nj =     0  F = 0.4D-08  inf=    1  time= 0:04
   13  it =    17  nf =    1617  nj =     0  F = 0.3D-08  inf=    1  time= 0:01
   14  it =    32  nf =    3134  nj =     0  F = 0.6D+00  inf=    1  time= 0:02
   15  it =     6  nf =     506  nj =     0  F = 0.4D-15  inf=    1  time= 0:00
   16  it =     6  nf =     506  nj =     0  F = 0.9D-09  inf=    1  time= 0:00
   17  it =    10  nf =     914  nj =     0  F = 0.1D+02  inf=    1  time= 0:00
   18  it =    30  nf =    2936  nj =     0  F = 0.3D-08  inf=    1  time= 0:05
   19  it =    32  nf =    3132  nj =     0  F = 0.2D+01  inf=    1  time= 0:02
   20  it =    10  nf =     919  nj =     0  F = 0.7D+00  inf=    1  time= 0:00
   21  it =   285  nf =   28694  nj =     0  F = 0.3D-09  inf=    1  time= 0:12
   22  it =    22  nf =    2090  nj =     0  F = 0.1D+02  inf=    1  time= 0:01
   23  it =    26  nf =    2487  nj =     0  F = 0.2D+02  inf=    1  time= 0:01
   24  it =     5  nf =     511  nj =     0  F = 0.5D+00  inf=    1  time= 0:01
   25  it =    16  nf =    1519  nj =     0  F = 0.3D+00  inf=    1  time= 0:01
   26  it =    14  nf =    1323  nj =     0  F = 0.8D-01  inf=    1  time= 0:01
   27  it =    11  nf =    1013  nj =     0  F = 0.5D-08  inf=    1  time= 0:00
   28  it =   396  nf =   40015  nj =     0  F = 0.9D+00  inf=    5  time= 0:10
   29  it =     6  nf =     506  nj =     0  F = 0.7D-13  inf=    1  time= 0:00
   30  it =    10  nf =     912  nj =     0  F = 0.1D-10  inf=    1  time= 0:00
   31  it =    20  nf =    1883  nj =     0  F = 0.1D+01  inf=    1  time= 0:01
   32  it =   122  nf =   12239  nj =     0  F = 0.3D+01  inf=    1  time= 0:06
   33  it =    11  nf =    1013  nj =     0  F = 0.5D-08  inf=    1  time= 0:00
   34  it =    18  nf =    1727  nj =     0  F = 0.2D-01  inf=    1  time= 0:01
   35  it =     6  nf =     606  nj =     0  F = 0.2D-07  inf=    4  time= 0:00
   36  it =    10  nf =     913  nj =     0  F = 0.2D-10  inf=    1  time= 0:00
   37  it =   401  nf =   40024  nj =     0  F = 0.5D+01  inf=    5  time= 0:13
   38  it =    17  nf =    1617  nj =     0  F = 0.3D-08  inf=    1  time= 0:00
   39  it =   314  nf =   31684  nj =     0  F = 0.2D-12  inf=    1  time= 0:08
   40  it =    18  nf =    1722  nj =     0  F = 0.2D-11  inf=    1  time= 0:00
   41  it =    42  nf =    4255  nj =     0  F = 0.7D+00  inf=    1  time= 0:01
   42  it =     6  nf =     506  nj =     0  F = 0.7D-13  inf=    1  time= 0:00
   43  it =    20  nf =    1920  nj =     0  F = 0.4D-14  inf=    1  time= 0:01
   44  it =    18  nf =    1718  nj =     0  F = 0.7D-09  inf=    1  time= 0:00
   45  it =    20  nf =    1921  nj =     0  F = 0.7D-09  inf=    1  time= 0:00
   46  it =     5  nf =     405  nj =     0  F = 0.2D-11  inf=    1  time= 0:01
   47  it =     6  nf =     506  nj =     0  F = 0.9D-09  inf=    1  time= 0:00
   48  it =    17  nf =    1618  nj =     0  F = 0.1D-14  inf=    1  time= 0:00
   49  it =    26  nf =    2530  nj =     0  F = 0.2D-11  inf=    1  time= 0:01
   50  it =    23  nf =    2225  nj =     0  F = 0.1D-09  inf=    1  time= 0:00
   51  it =     3  nf =     203  nj =     0  F = 0.2D-09  inf=    1  time= 0:00
   52  it =    12  nf =    1114  nj =     0  F = 0.9D-11  inf=    1  time= 0:01
   53  it =    14  nf =    1314  nj =     0  F = 0.1D-14  inf=    1  time= 0:00
   54  it =    78  nf =    7909  nj =     0  F = 0.6D-01  inf=    1  time= 0:03
   55  it =    37  nf =    3647  nj =     0  F = 0.5D-12  inf=    1  time= 0:02
   56  it =    11  nf =    1118  nj =     0  F = 0.2D-03  inf=    1  time= 0:00
   57  it =     5  nf =     405  nj =     0  F = 0.1D-13  inf=    1  time= 0:00
   58  it =    14  nf =    1314  nj =     0  F = 0.3D-10  inf=    1  time= 0:01
   59  it =     9  nf =     809  nj =     0  F = 0.5D-10  inf=    1  time= 0:00
   60  it =    11  nf =    1015  nj =     0  F = 0.8D-12  inf=    1  time= 0:00
   61  it =     4  nf =     304  nj =     0  F = 0.9D-14  inf=    1  time= 0:00
   62  it =    27  nf =    2634  nj =     0  F = 0.1D-08  inf=    1  time= 0:01
------------------------------------------------------------------------------
Total  it =  2828  nf =  279884  nj =     0      succesful =  60     time= 1:46
```

```
Test for subroutine lmdif:    200  variables
------------------------------------------------------------------------------
   1  it =    16  nf =    3021  nj =     0  F = 0.2D-09  inf=    1  time= 0:02
   2  it =    18  nf =    3418  nj =     0  F = 0.7D-09  inf=    1  time= 0:02
   3  it =    77  nf =   15289  nj =     0  F = 0.3D-02  inf=    1  time= 0:16
   4  it =     6  nf =    1010  nj =     0  F = 0.3D+07  inf=    1  time= 0:02
   5  it =    32  nf =    6232  nj =     0  F = 0.2D-12  inf=    1  time= 0:05
   6  it =    62  nf =   12276  nj =     0  F = 0.2D-03  inf=    1  time= 1:44
   7  it =    12  nf =    2212  nj =     0  F = 0.2D-10  inf=    1  time= 0:02
   8  it =     3  nf =     403  nj =     0  F = 0.6D-10  inf=    1  time= 0:00
   9  it =     4  nf =     604  nj =     0  F = 0.1D-12  inf=    1  time= 0:02
  10  it =     5  nf =     805  nj =     0  F = 0.8D-09  inf=    1  time= 0:01
  11  it =   236  nf =   47242  nj =     0  F = 0.8D-14  inf=    1  time= 1:05
  12  it =   150  nf =   29985  nj =     0  F = 0.6D-14  inf=    1  time= 1:06
  13  it =    17  nf =    3217  nj =     0  F = 0.3D-08  inf=    1  time= 0:05
  14  it =    28  nf =    5431  nj =     0  F = 0.6D+00  inf=    1  time= 0:10
  15  it =     6  nf =    1006  nj =     0  F = 0.4D-15  inf=    1  time= 0:00
  16  it =     6  nf =    1006  nj =     0  F = 0.9D-09  inf=    1  time= 0:01
  17  it =     8  nf =    1412  nj =     0  F = 0.1D+02  inf=    1  time= 0:02
  18  it =    30  nf =    5836  nj =     0  F = 0.2D-08  inf=    1  time= 0:28
  19  it =    24  nf =    4624  nj =     0  F = 0.2D+01  inf=    1  time= 0:11
  20  it =    14  nf =    2827  nj =     0  F = 0.7D+00  inf=    1  time= 0:05
  21  it =   399  nf =   80005  nj =     0  F = 0.3D+01  inf=    5  time= 1:52
  22  it =    20  nf =    3827  nj =     0  F = 0.1D+02  inf=    1  time= 0:07
  23  it =    24  nf =    4637  nj =     0  F = 0.2D+02  inf=    1  time= 0:09
  24  it =     5  nf =    1011  nj =     0  F = 0.5D+00  inf=    1  time= 0:03
  25  it =    16  nf =    3019  nj =     0  F = 0.3D+00  inf=    1  time= 0:07
  26  it =    16  nf =    3226  nj =     0  F = 0.8D-01  inf=    1  time= 0:09
  27  it =    11  nf =    2013  nj =     0  F = 0.2D-08  inf=    1  time= 0:01
  28  it =    20  nf =    3820  nj =     0  F = 0.1D-10  inf=    1  time= 0:03
  29  it =     6  nf =    1006  nj =     0  F = 0.7D-13  inf=    1  time= 0:00
  30  it =    13  nf =    2416  nj =     0  F = 0.2D-12  inf=    1  time= 0:02
  31  it =    19  nf =    3620  nj =     0  F = 0.1D+01  inf=    1  time= 0:06
  32  it =   120  nf =   23938  nj =     0  F = 0.3D+01  inf=    1  time= 0:38
  33  it =    11  nf =    2013  nj =     0  F = 0.2D-08  inf=    1  time= 0:02
  34  it =    24  nf =    4633  nj =     0  F = 0.2D-01  inf=    1  time= 0:05
  35  it =     6  nf =    1206  nj =     0  F = 0.3D-07  inf=    4  time= 0:01
  36  it =    14  nf =    2619  nj =     0  F = 0.1D-13  inf=    1  time= 0:02
  37  it =   401  nf =   80023  nj =     0  F = 0.5D+01  inf=    5  time= 1:13
  38  it =    17  nf =    3217  nj =     0  F = 0.3D-08  inf=    1  time= 0:02
  39  it =   382  nf =   76662  nj =     0  F = 0.2D-10  inf=    1  time= 0:57
  40  it =    21  nf =    4027  nj =     0  F = 0.9D-09  inf=    1  time= 0:04
  41  it =    44  nf =    8653  nj =     0  F = 0.2D-09  inf=    1  time= 0:08
  42  it =     6  nf =    1006  nj =     0  F = 0.7D-13  inf=    1  time= 0:01
  43  it =    20  nf =    3820  nj =     0  F = 0.6D-12  inf=    1  time= 0:02
  44  it =    18  nf =    3418  nj =     0  F = 0.8D-09  inf=    1  time= 0:02
  45  it =    20  nf =    3821  nj =     0  F = 0.7D-09  inf=    1  time= 0:02
  46  it =     5  nf =     805  nj =     0  F = 0.2D-11  inf=    1  time= 0:01
  47  it =     6  nf =    1006  nj =     0  F = 0.9D-09  inf=    1  time= 0:00
  48  it =    17  nf =    3218  nj =     0  F = 0.1D-14  inf=    1  time= 0:03
  49  it =    21  nf =    4023  nj =     0  F = 0.1D-09  inf=    1  time= 0:02
  50  it =    18  nf =    3418  nj =     0  F = 0.9D-11  inf=    1  time= 0:04
  51  it =     3  nf =     403  nj =     0  F = 0.6D-10  inf=    1  time= 0:00
  52  it =    23  nf =    4428  nj =     0  F = 0.2D-08  inf=    1  time= 0:04
  53  it =    13  nf =    2413  nj =     0  F = 0.6D-09  inf=    1  time= 0:02
  54  it =   106  nf =   21347  nj =     0  F = 0.1D-01  inf=    1  time= 0:26
  55  it =   176  nf =   35202  nj =     0  F = 0.1D-08  inf=    1  time= 0:33
  56  it =     9  nf =    1577  nj =     0  F = 0.2D-09  inf=    1  time= 0:01
  57  it =     5  nf =     789  nj =     0  F = 0.6D-14  inf=    1  time= 0:00
  58  it =    14  nf =    2562  nj =     0  F = 0.3D-12  inf=    1  time= 0:02
  59  it =     9  nf =    1577  nj =     0  F = 0.8D-10  inf=    1  time= 0:01
  60  it =    12  nf =    2171  nj =     0  F = 0.7D-14  inf=    1  time= 0:02
  61  it =     4  nf =     592  nj =     0  F = 0.2D-12  inf=    1  time= 0:01
  62  it =    29  nf =    5525  nj =     0  F = 0.9D-12  inf=    1  time= 0:06
------------------------------------------------------------------------------
Total  it =  2877  nf =  566568  nj =     0      succesful =  60     time=12:55
```

```
Test for subroutine tensolve:    100  variables
------------------------------------------------------------------------------
   1  it =    17  nf =     25  nj =    17  F = 0.1D-14  inf=    1  time= 0:01
   2  it =    11  nf =     13  nj =    11  F = 0.1D-04  inf=    2  time= 0:00
   3  it =    24  nf =     36  nj =    24  F = 0.3D-02  inf=    2  time= 0:00
   4  it =   245  nf =    269  nj =   245  F = 0.1D+03  inf=    2  time= 0:08
   5  it =    17  nf =     17  nj =    17  F = 0.0D+00  inf=    1  time= 0:00
   6  it =     8  nf =     10  nj =     8  F = 0.4D-05  inf=    2  time= 0:00
   7  it =     4  nf =      4  nj =     4  F = 0.3D-06  inf=    2  time= 0:00
   8  it =     2  nf =     16  nj =     2  F = 0.1D-05  inf=    2  time= 0:00
   9  it =     3  nf =      4  nj =     3  F = 0.2D-06  inf=    2  time= 0:00
  10  it =     5  nf =      6  nj =     5  F = 0.8D-09  inf=    1  time= 0:00
  11  it =   175  nf =    178  nj =   175  F = 0.4D-14  inf=    1  time= 0:04
  12  it =    70  nf =     78  nj =    70  F = 0.2D-14  inf=    1  time= 0:02
  13  it =    11  nf =     13  nj =    11  F = 0.1D-04  inf=    2  time= 0:01
  14  it =    44  nf =     45  nj =    44  F = 0.6D+00  inf=    2  time= 0:01
  15  it =     5  nf =      6  nj =     5  F = 0.2D-08  inf=    1  time= 0:00
  16  it =     6  nf =      6  nj =     6  F = 0.1D-08  inf=    1  time= 0:00
  17  it =    25  nf =     37  nj =    25  F = 0.1D+02  inf=    2  time= 0:01
  18  it =    11  nf =     17  nj =    11  F = 0.3D-04  inf=    2  time= 0:01
  19  it =    39  nf =     42  nj =    39  F = 0.2D+01  inf=    2  time= 0:01
  20  it =   772  nf =    804  nj =   772  F = 0.7D+00  inf=    2  time= 0:20
  21  it =   301  nf =    310  nj =   301  F = 0.7D-12  inf=    1  time= 0:07
  22  it =   801  nf =    855  nj =   801  F = 0.1D+02  inf=    5  time= 0:20
  23  it =    37  nf =     47  nj =    37  F = 0.2D+02  inf=    2  time= 0:01
  24  it =     6  nf =      7  nj =     6  F = 0.5D+00  inf=    2  time= 0:00
  25  it =     6  nf =      9  nj =     6  F = 0.3D+00  inf=    2  time= 0:01
  26  it =     8  nf =      9  nj =     8  F = 0.8D-01  inf=    2  time= 0:00
  27  it =    10  nf =     12  nj =    10  F = 0.6D-10  inf=    1  time= 0:00
  28  it =    13  nf =     16  nj =    13  F = 0.2D-09  inf=    1  time= 0:00
  29  it =    12  nf =     16  nj =    12  F = 0.1D-06  inf=    2  time= 0:00
  30  it =     8  nf =     16  nj =     8  F = 0.4D-13  inf=    1  time= 0:01
  31  it =    31  nf =     36  nj =    31  F = 0.1D+01  inf=    2  time= 0:00
  32  it =   484  nf =    524  nj =   484  F = 0.3D+01  inf=    2  time= 0:13
  33  it =    10  nf =     12  nj =    10  F = 0.6D-10  inf=    1  time= 0:00
  34  it =   801  nf =    853  nj =   801  F = 0.2D-01  inf=    5  time= 0:11
  35  it =     4  nf =      5  nj =     4  F = 0.7D-10  inf=    1  time= 0:00
  36  it =    10  nf =     16  nj =    10  F = 0.5D-12  inf=    1  time= 0:00
  37  it =    13  nf =     13  nj =    13  F = 0.3D-12  inf=    1  time= 0:00
  38  it =    12  nf =     12  nj =    12  F = 0.8D-05  inf=    2  time= 0:00
  39  it =    57  nf =     63  nj =    57  F = 0.3D-11  inf=    1  time= 0:01
  40  it =    16  nf =     20  nj =    16  F = 0.1D-12  inf=    1  time= 0:00
  41  it =    18  nf =     23  nj =    18  F = 0.2D-07  inf=    2  time= 0:00
  42  it =     6  nf =     10  nj =     6  F = 0.2D-10  inf=    1  time= 0:01
  43  it =    13  nf =     26  nj =    13  F = 0.8D-10  inf=    1  time= 0:00
  44  it =    11  nf =     13  nj =    11  F = 0.1D-04  inf=    2  time= 0:00
  45  it =    10  nf =     12  nj =    10  F = 0.2D-04  inf=    2  time= 0:00
  46  it =     5  nf =      9  nj =     5  F = 0.1D-13  inf=    1  time= 0:00
  47  it =     6  nf =      6  nj =     6  F = 0.1D-08  inf=    1  time= 0:00
  48  it =   801  nf =   1605  nj =   801  F = 0.5D-01  inf=    5  time= 0:09
  49  it =    30  nf =     37  nj =    30  F = 0.4D-13  inf=    1  time= 0:00
  50  it =    11  nf =     12  nj =    11  F = 0.8D+00  inf=    6  time= 0:00
  51  it =     2  nf =     16  nj =     2  F = 0.1D-05  inf=    2  time= 0:00
  52  it =    11  nf =     13  nj =    11  F = 0.4D-12  inf=    1  time= 0:00
  53  it =    12  nf =     12  nj =    12  F = 0.5D-05  inf=    2  time= 0:00
  54  it =     9  nf =     12  nj =     9  F = 0.9D-10  inf=    1  time= 0:01
  55  it =   801  nf =   1378  nj =   801  F = 0.3D-02  inf=    5  time= 0:11
  56  it =   385  nf =    466  nj =   385  F = 0.2D-03  inf=    2  time= 0:05
  57  it =     4  nf =      7  nj =     4  F = 0.3D-07  inf=    2  time= 0:00
  58  it =    10  nf =     14  nj =    10  F = 0.2D-12  inf=    1  time= 0:00
  59  it =     8  nf =     11  nj =     8  F = 0.8D-06  inf=    2  time= 0:00
  60  it =    11  nf =     14  nj =    11  F = 0.4D-09  inf=    1  time= 0:00
  61  it =    12  nf =     21  nj =    12  F = 0.7D-07  inf=    2  time= 0:00
  62  it =    10  nf =     17  nj =    10  F = 0.2D-10  inf=    1  time= 0:00
------------------------------------------------------------------------------
Total  it =  6320  nf =   8211  nj =  6320      succesful =  57     time= 2:02
```

Test for subroutine tensolve: 200 variables

1	it =	17	nf =	25	nj =	17	F =	0.2D-14	inf=	1	time=	0:01
2	it =	11	nf =	13	nj =	11	F =	0.1D-04	inf=	2	time=	0:01
3	it =	19	nf =	27	nj =	19	F =	0.3D-02	inf=	2	time=	0:01
4	it =	2	nf =	3	nj =	2	F =	0.3D+07	inf=	2	time=	0:01
5	it =	19	nf =	19	nj =	19	F =	0.0D+00	inf=	1	time=	0:01
6	it =	10	nf =	15	nj =	10	F =	0.3D-04	inf=	2	time=	0:02
7	it =	4	nf =	5	nj =	4	F =	0.8D-07	inf=	2	time=	0:00
8	it =	2	nf =	19	nj =	2	F =	0.4D-06	inf=	2	time=	0:00
9	it =	3	nf =	4	nj =	3	F =	0.2D-06	inf=	2	time=	0:00
10	it =	5	nf =	6	nj =	5	F =	0.8D-09	inf=	1	time=	0:01
11	it =	231	nf =	232	nj =	231	F =	0.2D-13	inf=	1	time=	0:33
12	it =	131	nf =	171	nj =	131	F =	0.2D-14	inf=	1	time=	0:30
13	it =	11	nf =	13	nj =	11	F =	0.1D-04	inf=	2	time=	0:02
14	it =	42	nf =	43	nj =	42	F =	0.6D+00	inf=	2	time=	0:08
15	it =	5	nf =	6	nj =	5	F =	0.2D-08	inf=	1	time=	0:00
16	it =	6	nf =	6	nj =	6	F =	0.1D-08	inf=	1	time=	0:01
17	it =	23	nf =	35	nj =	23	F =	0.1D+02	inf=	2	time=	0:03
18	it =	16	nf =	30	nj =	16	F =	0.4D-04	inf=	2	time=	0:15
19	it =	35	nf =	38	nj =	35	F =	0.2D+01	inf=	2	time=	0:09
20	it =	801	nf =	821	nj =	801	F =	0.7D+00	inf=	5	time=	2:26
21	it =	569	nf =	578	nj =	569	F =	0.9D-13	inf=	1	time=	1:21
22	it =	801	nf =	862	nj =	801	F =	0.1D+02	inf=	5	time=	2:28
23	it =	32	nf =	42	nj =	32	F =	0.2D+02	inf=	2	time=	0:07
24	it =	6	nf =	6	nj =	6	F =	0.5D+00	inf=	2	time=	0:02
25	it =	6	nf =	9	nj =	6	F =	0.3D+00	inf=	2	time=	0:02
26	it =	8	nf =	9	nj =	8	F =	0.8D-01	inf=	2	time=	0:03
27	it =	10	nf =	14	nj =	10	F =	0.9D-07	inf=	2	time=	0:01
28	it =	27	nf =	32	nj =	27	F =	0.6D-10	inf=	1	time=	0:02
29	it =	12	nf =	16	nj =	12	F =	0.3D-06	inf=	2	time=	0:01
30	it =	10	nf =	18	nj =	10	F =	0.4D-13	inf=	1	time=	0:01
31	it =	30	nf =	33	nj =	30	F =	0.1D+01	inf=	2	time=	0:06
32	it =	447	nf =	491	nj =	447	F =	0.3D+01	inf=	2	time=	1:17
33	it =	10	nf =	14	nj =	10	F =	0.9D-07	inf=	2	time=	0:00
34	it =	801	nf =	854	nj =	801	F =	0.1D-01	inf=	5	time=	1:19
35	it =	4	nf =	5	nj =	4	F =	0.1D-09	inf=	1	time=	0:00
36	it =	11	nf =	16	nj =	11	F =	0.6D-08	inf=	1	time=	0:01
37	it =	19	nf =	27	nj =	19	F =	0.1D-12	inf=	1	time=	0:05
38	it =	11	nf =	12	nj =	11	F =	0.2D-04	inf=	2	time=	0:01
39	it =	26	nf =	37	nj =	26	F =	0.1D-07	inf=	2	time=	0:01
40	it =	15	nf =	19	nj =	15	F =	0.9D-09	inf=	1	time=	0:02
41	it =	16	nf =	18	nj =	16	F =	0.6D-11	inf=	1	time=	0:01
42	it =	7	nf =	11	nj =	7	F =	0.1D-14	inf=	1	time=	0:00
43	it =	13	nf =	26	nj =	13	F =	0.8D-10	inf=	1	time=	0:01
44	it =	11	nf =	13	nj =	11	F =	0.1D-04	inf=	2	time=	0:01
45	it =	10	nf =	12	nj =	10	F =	0.2D-04	inf=	2	time=	0:01
46	it =	4	nf =	8	nj =	4	F =	0.3D-06	inf=	2	time=	0:00
47	it =	6	nf =	6	nj =	6	F =	0.1D-08	inf=	1	time=	0:00
48	it =	801	nf =	1611	nj =	801	F =	0.6D-01	inf=	5	time=	0:53
49	it =	30	nf =	37	nj =	30	F =	0.4D-13	inf=	1	time=	0:02
50	it =	12	nf =	13	nj =	12	F =	0.2D+00	inf=	6	time=	0:01
51	it =	2	nf =	19	nj =	2	F =	0.4D-06	inf=	2	time=	0:00
52	it =	12	nf =	15	nj =	12	F =	0.1D-07	inf=	2	time=	0:01
53	it =	11	nf =	11	nj =	11	F =	0.7D-04	inf=	2	time=	0:01
54	it =	8	nf =	15	nj =	8	F =	0.1D-08	inf=	1	time=	0:00
55	it =	801	nf =	904	nj =	801	F =	0.7D-01	inf=	5	time=	1:13
56	it =	8	nf =	16	nj =	8	F =	0.2D-06	inf=	2	time=	0:01
57	it =	4	nf =	7	nj =	4	F =	0.2D-07	inf=	2	time=	0:00
58	it =	9	nf =	14	nj =	9	F =	0.9D-10	inf=	1	time=	0:01
59	it =	8	nf =	11	nj =	8	F =	0.9D-06	inf=	2	time=	0:00
60	it =	13	nf =	16	nj =	13	F =	0.7D-14	inf=	1	time=	0:01
61	it =	10	nf =	20	nj =	10	F =	0.2D-06	inf=	2	time=	0:01
62	it =	9	nf =	16	nj =	9	F =	0.4D-07	inf=	2	time=	0:01
Total	it =	6053	nf =	7444	nj =	6053			succesful =	56	time=	13:35

Test for subroutine dnls1: 100 variables

1	it =	16	nf =	43	nj =	30	F =	0.2D-14	inf=	1	time= 0:01
2	it =	18	nf =	37	nj =	34	F =	0.7D-09	inf=	1	time= 0:00
3	it =	176	nf =	423	nj =	350	F =	0.3D-02	inf=	1	time= 0:05
4	it =	44	nf =	111	nj =	86	F =	0.1D+03	inf=	1	time= 0:02
5	it =	26	nf =	53	nj =	50	F =	0.6D-09	inf=	1	time= 0:01
6	it =	24	nf =	75	nj =	46	F =	0.3D-03	inf=	1	time= 0:01
7	it =	2	nf =	5	nj =	4	F =	0.1D+01	inf=	4	time= 0:00
8	it =	3	nf =	7	nj =	4	F =	0.2D-09	inf=	1	time= 0:00
9	it =	4	nf =	9	nj =	6	F =	0.3D-14	inf=	1	time= 0:00
10	it =	5	nf =	11	nj =	8	F =	0.8D-09	inf=	1	time= 0:00
11	it =	126	nf =	261	nj =	250	F =	0.2D-13	inf=	1	time= 0:04
12	it =	76	nf =	183	nj =	150	F =	0.4D-08	inf=	1	time= 0:05
13	it =	17	nf =	35	nj =	32	F =	0.3D-08	inf=	1	time= 0:00
14	it =	33	nf =	67	nj =	64	F =	0.6D+00	inf=	1	time= 0:02
15	it =	6	nf =	13	nj =	10	F =	0.5D-15	inf=	1	time= 0:00
16	it =	6	nf =	13	nj =	10	F =	0.9D-09	inf=	1	time= 0:00
17	it =	10	nf =	29	nj =	18	F =	0.1D+02	inf=	1	time= 0:00
18	it =	30	nf =	73	nj =	58	F =	0.3D-08	inf=	1	time= 0:03
19	it =	32	nf =	65	nj =	62	F =	0.2D+01	inf=	1	time= 0:02
20	it =	10	nf =	39	nj =	18	F =	0.7D+00	inf=	1	time= 0:00
21	it =	285	nf =	589	nj =	568	F =	0.3D-09	inf=	1	time= 0:10
22	it =	23	nf =	65	nj =	44	F =	0.1D+02	inf=	1	time= 0:01
23	it =	26	nf =	75	nj =	50	F =	0.2D+02	inf=	1	time= 0:01
24	it =	5	nf =	23	nj =	10	F =	0.5D+00	inf=	1	time= 0:00
25	it =	6	nf =	13	nj =	10	F =	0.3D+00	inf=	1	time= 0:01
26	it =	15	nf =	51	nj =	30	F =	0.8D-01	inf=	1	time= 0:01
27	it =	11	nf =	27	nj =	20	F =	0.2D-08	inf=	1	time= 0:00
28	it =	472	nf =	1001	nj =	942	F =	0.9D+00	inf=	5	time= 0:10
29	it =	14	nf =	29	nj =	26	F =	0.4D-08	inf=	1	time= 0:00
30	it =	10	nf =	25	nj =	18	F =	0.1D-10	inf=	1	time= 0:00
31	it =	20	nf =	43	nj =	38	F =	0.1D+01	inf=	1	time= 0:01
32	it =	123	nf =	283	nj =	244	F =	0.3D+01	inf=	1	time= 0:05
33	it =	11	nf =	27	nj =	20	F =	0.2D-08	inf=	1	time= 0:00
34	it =	18	nf =	55	nj =	34	F =	0.2D-01	inf=	1	time= 0:01
35	it =	4	nf =	9	nj =	6	F =	0.7D-10	inf=	1	time= 0:00
36	it =	10	nf =	27	nj =	18	F =	0.2D-10	inf=	1	time= 0:00
37	it =	482	nf =	1001	nj =	962	F =	0.5D+01	inf=	5	time= 0:11
38	it =	17	nf =	35	nj =	32	F =	0.3D-08	inf=	1	time= 0:01
39	it =	313	nf =	765	nj =	624	F =	0.3D-08	inf=	1	time= 0:07
40	it =	18	nf =	45	nj =	34	F =	0.2D-11	inf=	1	time= 0:00
41	it =	43	nf =	113	nj =	84	F =	0.7D+00	inf=	1	time= 0:01
42	it =	6	nf =	13	nj =	10	F =	0.8D-13	inf=	1	time= 0:00
43	it =	20	nf =	41	nj =	38	F =	0.0D+00	inf=	1	time= 0:01
44	it =	18	nf =	37	nj =	34	F =	0.7D-09	inf=	1	time= 0:00
45	it =	20	nf =	43	nj =	38	F =	0.7D-09	inf=	1	time= 0:00
46	it =	5	nf =	11	nj =	8	F =	0.2D-11	inf=	1	time= 0:00
47	it =	6	nf =	13	nj =	10	F =	0.9D-09	inf=	1	time= 0:00
48	it =	17	nf =	37	nj =	32	F =	0.1D-14	inf=	1	time= 0:01
49	it =	26	nf =	61	nj =	50	F =	0.3D-11	inf=	1	time= 0:00
50	it =	23	nf =	51	nj =	44	F =	0.3D-11	inf=	1	time= 0:01
51	it =	3	nf =	7	nj =	4	F =	0.2D-09	inf=	1	time= 0:00
52	it =	12	nf =	29	nj =	22	F =	0.3D-12	inf=	1	time= 0:00
53	it =	14	nf =	29	nj =	26	F =	0.5D-15	inf=	1	time= 0:00
54	it =	84	nf =	235	nj =	166	F =	0.6D-01	inf=	1	time= 0:04
55	it =	37	nf =	97	nj =	72	F =	0.3D-10	inf=	1	time= 0:01
56	it =	11	nf =	37	nj =	22	F =	0.2D-03	inf=	1	time= 0:00
57	it =	5	nf =	11	nj =	8	F =	0.1D-14	inf=	1	time= 0:00
58	it =	14	nf =	29	nj =	26	F =	0.2D-10	inf=	1	time= 0:01
59	it =	9	nf =	19	nj =	16	F =	0.5D-10	inf=	1	time= 0:00
60	it =	11	nf =	31	nj =	20	F =	0.8D-12	inf=	1	time= 0:00
61	it =	16	nf =	33	nj =	30	F =	0.1D-08	inf=	1	time= 0:00
62	it =	27	nf =	69	nj =	52	F =	0.1D-08	inf=	1	time= 0:01
Total	it =	2974	nf =	6786	nj =	5832		succesful =		60	time= 1:27

```
Test for subroutine dnls1:    200  variables
-------------------------------------------------------------------------------
    1  it =    16  nf =     43  nj =    30  F = 0.2D-14  inf=    1  time= 0:02
    2  it =    18  nf =     37  nj =    34  F = 0.7D-09  inf=    1  time= 0:01
    3  it =    99  nf =    237  nj =   196  F = 0.3D-02  inf=    1  time= 0:19
    4  it =     8  nf =     23  nj =    14  F = 0.3D+07  inf=    1  time= 0:03
    5  it =    32  nf =     65  nj =    62  F = 0.0D+00  inf=    1  time= 0:04
    6  it =    39  nf =    115  nj =    76  F = 0.2D-03  inf=    1  time= 0:10
    7  it =     2  nf =      5  nj =     4  F = 0.1D+01  inf=    4  time= 0:01
    8  it =     3  nf =      7  nj =     4  F = 0.5D-10  inf=    1  time= 0:00
    9  it =     4  nf =      9  nj =     6  F = 0.3D-14  inf=    1  time= 0:00
   10  it =     5  nf =     11  nj =     8  F = 0.8D-09  inf=    1  time= 0:01
   11  it =   236  nf =    485  nj =   470  F = 0.4D-14  inf=    1  time= 1:01
   12  it =   152  nf =    385  nj =   302  F = 0.2D-14  inf=    1  time= 1:02
   13  it =    17  nf =     35  nj =    32  F = 0.3D-08  inf=    1  time= 0:04
   14  it =    30  nf =     67  nj =    58  F = 0.6D+00  inf=    1  time= 0:10
   15  it =     6  nf =     13  nj =    10  F = 0.5D-15  inf=    1  time= 0:01
   16  it =     6  nf =     13  nj =    10  F = 0.9D-09  inf=    1  time= 0:00
   17  it =     8  nf =     25  nj =    14  F = 0.1D+02  inf=    1  time= 0:02
   18  it =    30  nf =     73  nj =    58  F = 0.2D-08  inf=    1  time= 0:23
   19  it =    24  nf =     49  nj =    46  F = 0.2D+01  inf=    1  time= 0:09
   20  it =    15  nf =     53  nj =    28  F = 0.7D+00  inf=    1  time= 0:05
   21  it =   554  nf =   1127  nj =  1106  F = 0.5D-10  inf=    1  time= 2:23
   22  it =    23  nf =     63  nj =    44  F = 0.1D+02  inf=    1  time= 0:07
   23  it =    24  nf =     75  nj =    46  F = 0.2D+02  inf=    1  time= 0:08
   24  it =     5  nf =     23  nj =    10  F = 0.5D+00  inf=    1  time= 0:02
   25  it =     6  nf =     13  nj =    10  F = 0.3D+00  inf=    1  time= 0:01
   26  it =    13  nf =     45  nj =    24  F = 0.8D-01  inf=    1  time= 0:05
   27  it =    11  nf =     27  nj =    20  F = 0.1D-09  inf=    1  time= 0:02
   28  it =    20  nf =     41  nj =    38  F = 0.1D-10  inf=    1  time= 0:02
   29  it =    14  nf =     29  nj =    26  F = 0.4D-08  inf=    1  time= 0:02
   30  it =    13  nf =     33  nj =    24  F = 0.2D-12  inf=    1  time= 0:02
   31  it =    19  nf =     41  nj =    36  F = 0.1D+01  inf=    1  time= 0:05
   32  it =   122  nf =    283  nj =   242  F = 0.3D+01  inf=    1  time= 0:35
   33  it =    11  nf =     27  nj =    20  F = 0.1D-09  inf=    1  time= 0:01
   34  it =    24  nf =     67  nj =    46  F = 0.2D-01  inf=    1  time= 0:05
   35  it =     4  nf =      9  nj =     6  F = 0.1D-09  inf=    1  time= 0:00
   36  it =    14  nf =     39  nj =    26  F = 0.3D-14  inf=    1  time= 0:03
   37  it =   576  nf =   1201  nj =  1150  F = 0.5D+01  inf=    5  time= 1:27
   38  it =    17  nf =     35  nj =    32  F = 0.3D-08  inf=    1  time= 0:02
   39  it =   383  nf =    929  nj =   764  F = 0.2D-14  inf=    1  time= 0:54
   40  it =    21  nf =     55  nj =    40  F = 0.9D-09  inf=    1  time= 0:03
   41  it =    44  nf =    107  nj =    86  F = 0.3D-08  inf=    1  time= 0:08
   42  it =     6  nf =     13  nj =    10  F = 0.8D-13  inf=    1  time= 0:00
   43  it =    20  nf =     41  nj =    38  F = 0.3D-12  inf=    1  time= 0:03
   44  it =    18  nf =     37  nj =    34  F = 0.8D-09  inf=    1  time= 0:02
   45  it =    20  nf =     43  nj =    38  F = 0.7D-09  inf=    1  time= 0:02
   46  it =     5  nf =     11  nj =     8  F = 0.2D-11  inf=    1  time= 0:00
   47  it =     6  nf =     13  nj =    10  F = 0.9D-09  inf=    1  time= 0:01
   48  it =    17  nf =     37  nj =    32  F = 0.1D-14  inf=    1  time= 0:02
   49  it =    21  nf =     47  nj =    40  F = 0.1D-09  inf=    1  time= 0:02
   50  it =    17  nf =     35  nj =    32  F = 0.4D-08  inf=    1  time= 0:03
   51  it =     3  nf =      7  nj =     4  F = 0.5D-10  inf=    1  time= 0:00
   52  it =    24  nf =     59  nj =    46  F = 0.7D-08  inf=    1  time= 0:04
   53  it =    13  nf =     27  nj =    24  F = 0.6D-09  inf=    1  time= 0:02
   54  it =    80  nf =    225  nj =   160  F = 0.1D-01  inf=    1  time= 0:21
   55  it =   186  nf =    445  nj =   370  F = 0.6D-10  inf=    1  time= 0:32
   56  it =     9  nf =     19  nj =    16  F = 0.2D-09  inf=    1  time= 0:01
   57  it =     5  nf =     11  nj =     8  F = 0.8D-15  inf=    1  time= 0:00
   58  it =    14  nf =     29  nj =    26  F = 0.2D-12  inf=    1  time= 0:02
   59  it =     9  nf =     19  nj =    16  F = 0.8D-10  inf=    1  time= 0:01
   60  it =    12  nf =     31  nj =    22  F = 0.7D-14  inf=    1  time= 0:01
   61  it =    15  nf =     31  nj =    28  F = 0.1D-08  inf=    1  time= 0:02
   62  it =    29  nf =     75  nj =    56  F = 0.9D-12  inf=    1  time= 0:05
-------------------------------------------------------------------------------
Total  it =  3197  nf =   7274  nj =  6276      succesful =  61     time=11:21
```

```
Test for subroutine dnls1_d:    100  variables
-------------------------------------------------------------------------------
   1  it =    16  nf =    3041  nj =     0  F = 0.2D-09  inf=    1  time= 0:00
   2  it =    18  nf =    3435  nj =     0  F = 0.7D-09  inf=    1  time= 0:00
   3  it =   180  nf =   36225  nj =     0  F = 0.3D-02  inf=    1  time= 0:06
   4  it =    48  nf =    9519  nj =     0  F = 0.1D+03  inf=    1  time= 0:03
   5  it =    26  nf =    5051  nj =     0  F = 0.6D-09  inf=    1  time= 0:00
   6  it =    36  nf =    7099  nj =     0  F = 0.3D-03  inf=    1  time= 0:09
   7  it =    11  nf =    2021  nj =     0  F = 0.9D-10  inf=    1  time= 0:00
   8  it =     3  nf =     405  nj =     0  F = 0.2D-09  inf=    1  time= 0:00
   9  it =     4  nf =     607  nj =     0  F = 0.8D-13  inf=    1  time= 0:00
  10  it =     5  nf =     809  nj =     0  F = 0.8D-09  inf=    1  time= 0:00
  11  it =   126  nf =   25259  nj =     0  F = 0.3D-13  inf=    1  time= 0:05
  12  it =    76  nf =   15181  nj =     0  F = 0.4D-08  inf=    1  time= 0:05
  13  it =    17  nf =    3233  nj =     0  F = 0.3D-08  inf=    1  time= 0:01
  14  it =    32  nf =    6267  nj =     0  F = 0.6D+00  inf=    1  time= 0:01
  15  it =     6  nf =    1011  nj =     0  F = 0.4D-15  inf=    1  time= 0:01
  16  it =     6  nf =    1011  nj =     0  F = 0.9D-09  inf=    1  time= 0:00
  17  it =    10  nf =    1827  nj =     0  F = 0.1D+02  inf=    1  time= 0:00
  18  it =    30  nf =    5871  nj =     0  F = 0.3D-08  inf=    1  time= 0:04
  19  it =    32  nf =    6263  nj =     0  F = 0.2D+01  inf=    1  time= 0:02
  20  it =    10  nf =    1837  nj =     0  F = 0.7D+00  inf=    1  time= 0:01
  21  it =   199  nf =   40009  nj =     0  F = 0.3D+01  inf=    5  time= 0:08
  22  it =    22  nf =    4179  nj =     0  F = 0.1D+02  inf=    1  time= 0:01
  23  it =    26  nf =    4973  nj =     0  F = 0.2D+02  inf=    1  time= 0:02
  24  it =     5  nf =    1021  nj =     0  F = 0.5D+00  inf=    1  time= 0:00
  25  it =    17  nf =    3237  nj =     0  F = 0.3D+00  inf=    1  time= 0:02
  26  it =    14  nf =    2645  nj =     0  F = 0.8D-01  inf=    1  time= 0:01
  27  it =    11  nf =    2025  nj =     0  F = 0.5D-08  inf=    1  time= 0:00
  28  it =   199  nf =   40017  nj =     0  F = 0.9D+00  inf=    5  time= 0:05
  29  it =     6  nf =    1011  nj =     0  F = 0.7D-13  inf=    1  time= 0:00
  30  it =    10  nf =    1823  nj =     0  F = 0.1D-10  inf=    1  time= 0:00
  31  it =    20  nf =    3765  nj =     0  F = 0.1D+01  inf=    1  time= 0:01
  32  it =   122  nf =   24477  nj =     0  F = 0.3D+01  inf=    1  time= 0:06
  33  it =    11  nf =    2025  nj =     0  F = 0.5D-08  inf=    1  time= 0:00
  34  it =    18  nf =    3453  nj =     0  F = 0.2D-01  inf=    1  time= 0:01
  35  it =     6  nf =    1211  nj =     0  F = 0.2D-07  inf=    4  time= 0:00
  36  it =    10  nf =    1825  nj =     0  F = 0.2D-10  inf=    1  time= 0:00
  37  it =   201  nf =   40037  nj =     0  F = 0.5D+01  inf=    5  time= 0:07
  38  it =    17  nf =    3233  nj =     0  F = 0.3D-08  inf=    1  time= 0:01
  39  it =   199  nf =   40075  nj =     0  F = 0.9D+00  inf=    5  time= 0:04
  40  it =    18  nf =    3443  nj =     0  F = 0.2D-11  inf=    1  time= 0:01
  41  it =    42  nf =    8509  nj =     0  F = 0.7D+00  inf=    1  time= 0:01
  42  it =     6  nf =    1011  nj =     0  F = 0.7D-13  inf=    1  time= 0:00
  43  it =    20  nf =    3839  nj =     0  F = 0.4D-14  inf=    1  time= 0:01
  44  it =    18  nf =    3435  nj =     0  F = 0.7D-09  inf=    1  time= 0:00
  45  it =    20  nf =    3841  nj =     0  F = 0.7D-09  inf=    1  time= 0:00
  46  it =     5  nf =     809  nj =     0  F = 0.2D-11  inf=    1  time= 0:01
  47  it =     6  nf =    1011  nj =     0  F = 0.9D-09  inf=    1  time= 0:00
  48  it =    17  nf =    3235  nj =     0  F = 0.1D-14  inf=    1  time= 0:00
  49  it =    26  nf =    5059  nj =     0  F = 0.2D-11  inf=    1  time= 0:01
  50  it =    23  nf =    4449  nj =     0  F = 0.1D-09  inf=    1  time= 0:00
  51  it =     3  nf =     405  nj =     0  F = 0.2D-09  inf=    1  time= 0:00
  52  it =    12  nf =    2227  nj =     0  F = 0.9D-11  inf=    1  time= 0:01
  53  it =    14  nf =    2627  nj =     0  F = 0.1D-14  inf=    1  time= 0:00
  54  it =    78  nf =   15817  nj =     0  F = 0.6D-01  inf=    1  time= 0:04
  55  it =    37  nf =    7293  nj =     0  F = 0.5D-12  inf=    1  time= 0:01
  56  it =    11  nf =    2235  nj =     0  F = 0.2D-03  inf=    1  time= 0:00
  57  it =     5  nf =     809  nj =     0  F = 0.1D-13  inf=    1  time= 0:01
  58  it =    14  nf =    2627  nj =     0  F = 0.3D-10  inf=    1  time= 0:00
  59  it =     9  nf =    1617  nj =     0  F = 0.5D-10  inf=    1  time= 0:00
  60  it =    11  nf =    2029  nj =     0  F = 0.8D-12  inf=    1  time= 0:01
  61  it =     4  nf =     607  nj =     0  F = 0.9D-14  inf=    1  time= 0:00
  62  it =    27  nf =    5267  nj =     0  F = 0.1D-08  inf=    1  time= 0:01
-------------------------------------------------------------------------------
Total  it =  2231  nf =  439214  nj =     0      succesful =  58     time= 1:31
```

```
Test for subroutine dnls1_d   200  variables
-------------------------------------------------------------------------------
    1  it =    16  nf =    6041  nj =     0  F = 0.2D-09  inf=    1  time= 0:02
    2  it =    18  nf =    6835  nj =     0  F = 0.7D-09  inf=    1  time= 0:02
    3  it =    77  nf =   30577  nj =     0  F = 0.3D-02  inf=    1  time= 0:15
    4  it =     6  nf =    2019  nj =     0  F = 0.3D+07  inf=    1  time= 0:03
    5  it =    32  nf =   12463  nj =     0  F = 0.2D-12  inf=    1  time= 0:05
    6  it =    62  nf =   24551  nj =     0  F = 0.2D-03  inf=    1  time= 1:44
    7  it =    12  nf =    4423  nj =     0  F = 0.2D-10  inf=    1  time= 0:02
    8  it =     3  nf =     805  nj =     0  F = 0.6D-10  inf=    1  time= 0:00
    9  it =     4  nf =    1207  nj =     0  F = 0.1D-12  inf=    1  time= 0:02
   10  it =     5  nf =    1609  nj =     0  F = 0.8D-09  inf=    1  time= 0:01
   11  it =   236  nf =  160009  nj =     0  F = 0.1D+01  inf=    5  time= 1:05
   12  it =   150  nf =   59969  nj =     0  F = 0.6D-14  inf=    1  time= 1:07
   13  it =    17  nf =    6433  nj =     0  F = 0.3D-08  inf=    1  time= 0:04
   14  it =    28  nf =   10861  nj =     0  F = 0.6D+00  inf=    1  time= 0:10
   15  it =     6  nf =    2011  nj =     0  F = 0.4D-15  inf=    1  time= 0:01
   16  it =     6  nf =    2011  nj =     0  F = 0.9D-09  inf=    1  time= 0:01
   17  it =     8  nf =    2823  nj =     0  F = 0.1D+02  inf=    1  time= 0:02
   18  it =    30  nf =   11671  nj =     0  F = 0.2D-08  inf=    1  time= 0:27
   19  it =    24  nf =    9247  nj =     0  F = 0.2D+01  inf=    1  time= 0:10
   20  it =    14  nf =    5653  nj =     0  F = 0.7D+00  inf=    1  time= 0:06
   21  it =   399  nf =  160009  nj =     0  F = 0.3D+01  inf=    5  time= 1:52
   22  it =    20  nf =    7653  nj =     0  F = 0.1D+02  inf=    1  time= 0:07
   23  it =    24  nf =    9273  nj =     0  F = 0.2D+02  inf=    1  time= 0:09
   24  it =     5  nf =    2021  nj =     0  F = 0.5D+00  inf=    1  time= 0:03
   25  it =    17  nf =    6835  nj =     0  F = 0.3D+00  inf=    1  time= 0:08
   26  it =    16  nf =    6451  nj =     0  F = 0.8D-01  inf=    1  time= 0:08
   27  it =    11  nf =    4025  nj =     0  F = 0.2D-08  inf=    1  time= 0:02
   28  it =    20  nf =    7639  nj =     0  F = 0.1D-10  inf=    1  time= 0:02
   29  it =     6  nf =    2011  nj =     0  F = 0.7D-13  inf=    1  time= 0:01
   30  it =    13  nf =    4831  nj =     0  F = 0.2D-12  inf=    1  time= 0:02
   31  it =    19  nf =    7239  nj =     0  F = 0.1D+01  inf=    1  time= 0:06
   32  it =   120  nf =   47875  nj =     0  F = 0.3D+01  inf=    1  time= 0:38
   33  it =    11  nf =    4025  nj =     0  F = 0.2D-08  inf=    1  time= 0:02
   34  it =    24  nf =    9265  nj =     0  F = 0.2D-01  inf=    1  time= 0:05
   35  it =     6  nf =    2411  nj =     0  F = 0.3D-07  inf=    4  time= 0:00
   36  it =    14  nf =    5237  nj =     0  F = 0.1D-13  inf=    1  time= 0:03
   37  it =   401  nf =  160045  nj =     0  F = 0.5D+01  inf=    5  time= 1:16
   38  it =    17  nf =    6433  nj =     0  F = 0.3D-08  inf=    1  time= 0:01
   39  it =   382  nf =  153323  nj =     0  F = 0.2D-10  inf=    1  time= 0:58
   40  it =    21  nf =    8053  nj =     0  F = 0.9D-09  inf=    1  time= 0:03
   41  it =    44  nf =   17305  nj =     0  F = 0.2D-09  inf=    1  time= 0:08
   42  it =     6  nf =    2011  nj =     0  F = 0.7D-13  inf=    1  time= 0:01
   43  it =    20  nf =    7639  nj =     0  F = 0.6D-12  inf=    1  time= 0:02
   44  it =    18  nf =    6835  nj =     0  F = 0.8D-09  inf=    1  time= 0:02
   45  it =    20  nf =    7641  nj =     0  F = 0.7D-09  inf=    1  time= 0:03
   46  it =     5  nf =    1609  nj =     0  F = 0.2D-11  inf=    1  time= 0:00
   47  it =     6  nf =    2011  nj =     0  F = 0.9D-09  inf=    1  time= 0:01
   48  it =    17  nf =    6435  nj =     0  F = 0.1D-14  inf=    1  time= 0:02
   49  it =    21  nf =    8045  nj =     0  F = 0.1D-09  inf=    1  time= 0:03
   50  it =    18  nf =    6835  nj =     0  F = 0.9D-11  inf=    1  time= 0:03
   51  it =     3  nf =     805  nj =     0  F = 0.6D-10  inf=    1  time= 0:01
   52  it =    23  nf =    8855  nj =     0  F = 0.2D-08  inf=    1  time= 0:04
   53  it =    13  nf =    4825  nj =     0  F = 0.6D-09  inf=    1  time= 0:01
   54  it =   106  nf =   42693  nj =     0  F = 0.1D-01  inf=    1  time= 0:27
   55  it =   176  nf =   70403  nj =     0  F = 0.1D-08  inf=    1  time= 0:33
   56  it =     9  nf =    3153  nj =     0  F = 0.2D-09  inf=    1  time= 0:01
   57  it =     5  nf =    1577  nj =     0  F = 0.6D-14  inf=    1  time= 0:00
   58  it =    14  nf =    5123  nj =     0  F = 0.3D-12  inf=    1  time= 0:03
   59  it =     9  nf =    3153  nj =     0  F = 0.8D-10  inf=    1  time= 0:01
   60  it =    12  nf =    4341  nj =     0  F = 0.7D-14  inf=    1  time= 0:02
   61  it =     4  nf =    1183  nj =     0  F = 0.2D-12  inf=    1  time= 0:00
   62  it =    29  nf =   11049  nj =     0  F = 0.9D-12  inf=    1  time= 0:06
-------------------------------------------------------------------------------
Total  it =  2878  nf = 1199398  nj =     0      succesful =  60     time=12:59
```

```
Test for subroutine dn2g:    100  variables
--------------------------------------------------------------------------------
   1  it =    22  nf =     36  nj =    23  F = 0.0D+00  inf=    4  time= 0:01
   2  it =    17  nf =     18  nj =    18  F = 0.3D-08  inf=    4  time= 0:01
   3  it =    90  nf =    140  nj =    91  F = 0.2D-01  inf=    2  time= 0:06
   4  it =    73  nf =     97  nj =    74  F = 0.2D+03  inf=    5  time= 0:10
   5  it =    16  nf =     22  nj =    17  F = 0.8D-09  inf=    4  time= 0:00
   6  it =    32  nf =     53  nj =    32  F = 0.4D-03  inf=    5  time= 0:04
   7  it =     2  nf =      4  nj =     2  F = 0.7D+00  inf=    5  time= 0:00
   8  it =     2  nf =      3  nj =     3  F = 0.8D-09  inf=    4  time= 0:00
   9  it =     3  nf =      4  nj =     4  F = 0.1D-13  inf=    4  time= 0:00
  10  it =     4  nf =      5  nj =     5  F = 0.8D-09  inf=    4  time= 0:01
  11  it =   152  nf =    154  nj =   153  F = 0.5D-11  inf=    4  time= 0:16
  12  it =    85  nf =    135  nj =    85  F = 0.1D+01  inf=    2  time= 0:14
  13  it =    16  nf =     17  nj =    17  F = 0.7D-08  inf=    4  time= 0:01
  14  it =    17  nf =     21  nj =    18  F = 0.4D+01  inf=    5  time= 0:03
  15  it =     4  nf =      5  nj =     5  F = 0.8D-08  inf=    4  time= 0:00
  16  it =     5  nf =      6  nj =     6  F = 0.1D-08  inf=    4  time= 0:00
  17  it =     9  nf =     16  nj =    10  F = 0.8D+02  inf=    5  time= 0:01
  18  it =    20  nf =     26  nj =    21  F = 0.5D-08  inf=    4  time= 0:07
  19  it =    20  nf =     21  nj =    21  F = 0.1D+02  inf=    5  time= 0:03
  20  it =    17  nf =     27  nj =    18  F = 0.4D+01  inf=    5  time= 0:02
  21  it =   394  nf =    613  nj =   395  F = 0.0D+00  inf=    4  time= 1:00
  22  it =    19  nf =     30  nj =    20  F = 0.5D+02  inf=    5  time= 0:02
  23  it =    27  nf =     40  nj =    28  F = 0.1D+03  inf=    5  time= 0:04
  24  it =     9  nf =     16  nj =     9  F = 0.3D+01  inf=    5  time= 0:01
  25  it =     5  nf =      6  nj =     6  F = 0.1D+01  inf=    5  time= 0:01
  26  it =    14  nf =     25  nj =    15  F = 0.5D+00  inf=    5  time= 0:01
  27  it =    22  nf =     30  nj =    23  F = 0.3D-02  inf=    5  time= 0:02
  28  it =   500  nf =    514  nj =   501  F = 0.7D+00  inf=    8  time= 0:22
  29  it =    13  nf =     14  nj =    14  F = 0.3D-08  inf=    4  time= 0:01
  30  it =    10  nf =     14  nj =    11  F = 0.3D-13  inf=    4  time= 0:00
  31  it =    16  nf =     21  nj =    17  F = 0.8D+01  inf=    5  time= 0:02
  32  it =    56  nf =     57  nj =    57  F = 0.2D+02  inf=    5  time= 0:06
  33  it =    22  nf =     30  nj =    23  F = 0.3D-02  inf=    5  time= 0:02
  34  it =    15  nf =     19  nj =    16  F = 0.2D-01  inf=    5  time= 0:01
  35  it =     3  nf =      4  nj =     4  F = 0.2D-09  inf=    4  time= 0:00
  36  it =     6  nf =      9  nj =     7  F = 0.7D-10  inf=    4  time= 0:01
  37  it =    69  nf =    110  nj =    70  F = 0.2D+02  inf=    5  time= 0:04
  38  it =    16  nf =     17  nj =    17  F = 0.3D-08  inf=    4  time= 0:00
  39  it =   500  nf =    510  nj =   501  F = 0.7D+00  inf=    8  time= 0:23
  40  it =    34  nf =     50  nj =    35  F = 0.7D+00  inf=    5  time= 0:02
  41  it =    23  nf =     34  nj =    24  F = 0.5D-10  inf=    4  time= 0:02
  42  it =     5  nf =      6  nj =     6  F = 0.8D-13  inf=    4  time= 0:00
  43  it =    15  nf =     17  nj =    16  F = 0.7D-09  inf=    4  time= 0:00
  44  it =    17  nf =     18  nj =    18  F = 0.3D-08  inf=    4  time= 0:01
  45  it =    18  nf =     22  nj =    19  F = 0.5D-08  inf=    4  time= 0:01
  46  it =     4  nf =      5  nj =     5  F = 0.1D-10  inf=    4  time= 0:00
  47  it =     5  nf =      6  nj =     6  F = 0.1D-08  inf=    4  time= 0:00
  48  it =    52  nf =     78  nj =    53  F = 0.1D-11  inf=    4  time= 0:03
  49  it =    16  nf =     20  nj =    17  F = 0.5D-13  inf=    4  time= 0:00
  50  it =    19  nf =     29  nj =    20  F = 0.1D+00  inf=    5  time= 0:01
  51  it =     2  nf =      3  nj =     3  F = 0.8D-09  inf=    4  time= 0:00
  52  it =    14  nf =     18  nj =    15  F = 0.2D-11  inf=    4  time= 0:01
  53  it =    12  nf =     13  nj =    13  F = 0.7D-08  inf=    4  time= 0:01
  54  it =    60  nf =     97  nj =    60  F = 0.3D+00  inf=    2  time= 0:04
  55  it =    12  nf =     18  nj =    13  F = 0.7D-12  inf=    4  time= 0:01
  56  it =    11  nf =     14  nj =    11  F = 0.6D-03  inf=    3  time= 0:00
  57  it =     4  nf =      5  nj =     5  F = 0.2D-14  inf=    4  time= 0:01
  58  it =    12  nf =     13  nj =    13  F = 0.4D-12  inf=    4  time= 0:00
  59  it =     8  nf =      9  nj =     9  F = 0.6D-10  inf=    4  time= 0:01
  60  it =    11  nf =     14  nj =    12  F = 0.2D-13  inf=    4  time= 0:00
  61  it =    14  nf =     15  nj =    15  F = 0.8D-08  inf=    4  time= 0:01
  62  it =    22  nf =     25  nj =    23  F = 0.3D-10  inf=    4  time= 0:01
--------------------------------------------------------------------------------
Total it =  2712  nf =   3418  nj =  2768      succesful =  60     time= 3:44
```

```
Test for subroutine dn2g:    200  variables
-------------------------------------------------------------------------------
   1  it =    22  nf =     36  nj =    23  F = 0.0D+00  inf=    4  time= 0:07
   2  it =    17  nf =     18  nj =    18  F = 0.4D-08  inf=    4  time= 0:05
   3  it =   135  nf =    225  nj =   136  F = 0.3D-01  inf=    2  time= 1:08
   4  it =     5  nf =      7  nj =     5  F = 0.5D+07  inf=    5  time= 0:05
   5  it =    18  nf =     26  nj =    19  F = 0.3D-09  inf=    4  time= 0:05
   6  it =    34  nf =     58  nj =    34  F = 0.2D-03  inf=    6  time= 0:27
   7  it =    10  nf =     12  nj =    11  F = 0.7D-08  inf=    4  time= 0:07
   8  it =     2  nf =      3  nj =     3  F = 0.3D-09  inf=    4  time= 0:00
   9  it =     3  nf =      4  nj =     4  F = 0.2D-13  inf=    4  time= 0:03
  10  it =     4  nf =      5  nj =     5  F = 0.8D-09  inf=    4  time= 0:01
  11  it =   207  nf =    210  nj =   208  F = 0.8D-15  inf=    4  time= 2:47
  12  it =   161  nf =    254  nj =   161  F = 0.1D+01  inf=    2  time= 3:13
  13  it =    16  nf =     17  nj =    17  F = 0.6D-08  inf=    4  time= 0:12
  14  it =    17  nf =     21  nj =    18  F = 0.5D+01  inf=    5  time= 0:18
  15  it =     5  nf =      6  nj =     6  F = 0.1D-14  inf=    4  time= 0:01
  16  it =     5  nf =      6  nj =     6  F = 0.1D-08  inf=    4  time= 0:02
  17  it =     9  nf =     14  nj =    10  F = 0.1D+03  inf=    5  time= 0:08
  18  it =    24  nf =     32  nj =    25  F = 0.8D-08  inf=    4  time= 0:58
  19  it =    30  nf =     31  nj =    31  F = 0.2D+02  inf=    2  time= 0:38
  20  it =    15  nf =     28  nj =    16  F = 0.6D+01  inf=    5  time= 0:15
  21  it =   500  nf =    878  nj =   501  F = 0.9D+01  inf=    8  time=11:03
  22  it =    26  nf =     35  nj =    26  F = 0.7D+02  inf=    5  time= 0:22
  23  it =    20  nf =     28  nj =    21  F = 0.2D+03  inf=    5  time= 0:22
  24  it =     9  nf =     16  nj =     9  F = 0.5D+01  inf=    5  time= 0:08
  25  it =     5  nf =      6  nj =     6  F = 0.2D+01  inf=    5  time= 0:05
  26  it =    15  nf =     24  nj =    15  F = 0.7D+00  inf=    5  time= 0:14
  27  it =    10  nf =     12  nj =    11  F = 0.1D-09  inf=    4  time= 0:03
  28  it =   500  nf =    527  nj =   501  F = 0.7D+00  inf=    8  time= 2:47
  29  it =    13  nf =     14  nj =    14  F = 0.3D-08  inf=    4  time= 0:05
  30  it =    11  nf =     18  nj =    12  F = 0.2D-08  inf=    4  time= 0:04
  31  it =    16  nf =     21  nj =    17  F = 0.1D+02  inf=    5  time= 0:16
  32  it =    57  nf =     60  nj =    58  F = 0.3D+02  inf=    5  time= 0:45
  33  it =    10  nf =     12  nj =    11  F = 0.1D-09  inf=    4  time= 0:04
  34  it =    20  nf =     29  nj =    21  F = 0.2D-01  inf=    2  time= 0:15
  35  it =     3  nf =      4  nj =     4  F = 0.3D-09  inf=    4  time= 0:01
  36  it =     6  nf =      9  nj =     7  F = 0.1D-10  inf=    4  time= 0:02
  37  it =   157  nf =    228  nj =   158  F = 0.2D+02  inf=    5  time= 1:00
  38  it =    16  nf =     17  nj =    17  F = 0.4D-08  inf=    4  time= 0:04
  39  it =   500  nf =    522  nj =   501  F = 0.7D+00  inf=    8  time= 2:47
  40  it =    18  nf =     26  nj =    19  F = 0.3D-11  inf=    4  time= 0:07
  41  it =    20  nf =     27  nj =    21  F = 0.7D-14  inf=    4  time= 0:10
  42  it =     5  nf =      6  nj =     6  F = 0.8D-13  inf=    4  time= 0:02
  43  it =    15  nf =     18  nj =    16  F = 0.0D+00  inf=    4  time= 0:04
  44  it =    17  nf =     18  nj =    18  F = 0.5D-08  inf=    4  time= 0:05
  45  it =    18  nf =     22  nj =    19  F = 0.7D-08  inf=    4  time= 0:05
  46  it =     4  nf =      5  nj =     5  F = 0.2D-10  inf=    4  time= 0:01
  47  it =     5  nf =      6  nj =     6  F = 0.1D-08  inf=    4  time= 0:02
  48  it =    52  nf =     78  nj =    53  F = 0.1D-11  inf=    4  time= 0:15
  49  it =    16  nf =     20  nj =    17  F = 0.3D-12  inf=    4  time= 0:05
  50  it =    19  nf =     26  nj =    20  F = 0.3D+00  inf=    5  time= 0:08
  51  it =     2  nf =      3  nj =     3  F = 0.3D-09  inf=    4  time= 0:01
  52  it =    16  nf =     20  nj =    17  F = 0.7D-12  inf=    4  time= 0:07
  53  it =    12  nf =     13  nj =    13  F = 0.3D-08  inf=    4  time= 0:03
  54  it =    64  nf =    107  nj =    65  F = 0.1D+00  inf=    5  time= 0:35
  55  it =    38  nf =     48  nj =    39  F = 0.3D-11  inf=    4  time= 0:21
  56  it =     8  nf =      9  nj =     9  F = 0.5D-09  inf=    4  time= 0:02
  57  it =     4  nf =      5  nj =     5  F = 0.3D-14  inf=    4  time= 0:01
  58  it =     8  nf =      9  nj =     9  F = 0.2D-08  inf=    4  time= 0:03
  59  it =     8  nf =      9  nj =     9  F = 0.1D-09  inf=    4  time= 0:02
  60  it =    11  nf =     16  nj =    12  F = 0.3D-09  inf=    4  time= 0:05
  61  it =    14  nf =     15  nj =    15  F = 0.4D-08  inf=    4  time= 0:04
  62  it =    24  nf =     28  nj =    25  F = 0.5D-14  inf=    4  time= 0:11
-------------------------------------------------------------------------------
Total  it =  3031  nf =   4007  nj =  3087      succesful =  59     time=33:46
```

```
Test for subroutine dson4:    100  variables
------------------------------------------------------------------------------
    1  it =    11  nf =      39  nj =    11  F = 0.0D+00  inf=    0  time= 0:00
    2  it =    17  nf =      19  nj =    17  F = 0.7D-09  inf=    0  time= 0:00
    3  it =    42  nf =     269  nj =    42  F = 0.1D-01  inf=    3  time= 0:01
    4          failed due to invalid operation
    5  it =    16  nf =      18  nj =    16  F = 0.0D+00  inf=    0  time= 0:00
    6  it =    13  nf =      50  nj =    13  F = 0.2D-11  inf=    0  time= 0:01
    7          failed due to invalid operation
    8  it =     2  nf =       4  nj =     2  F = 0.2D-09  inf=    0  time= 0:00
    9  it =     3  nf =       5  nj =     3  F = 0.3D-14  inf=    0  time= 0:00
   10  it =     4  nf =       6  nj =     4  F = 0.8D-09  inf=    0  time= 0:00
   11  it =    10  nf =      44  nj =    10  F = 0.2D+01  inf=    3  time= 0:00
   12  it =     4  nf =      23  nj =     4  F = 0.2D+01  inf=    3  time= 0:00
   13  it =    12  nf =      14  nj =    13  F = 0.8D-06  inf=    0  time= 0:00
   14  it =     0  nf =       2  nj =     1  F = 0.3D+02  inf=    2  time= 0:00
   15  it =     5  nf =       7  nj =     5  F = 0.5D-15  inf=    0  time= 0:00
   16  it =     5  nf =       7  nj =     5  F = 0.9D-09  inf=    0  time= 0:00
   17  it =     3  nf =      20  nj =     3  F = 0.1D+02  inf=    3  time= 0:00
   18  it =     6  nf =      12  nj =     7  F = 0.9D-02  inf=    2  time= 0:01
   19  it =     7  nf =      25  nj =     7  F = 0.2D+01  inf=    3  time= 0:00
   20  it =    15  nf =     152  nj =    15  F = 0.7D+00  inf=    3  time= 0:00
   21  it =     9  nf =      56  nj =     9  F = 0.2D+01  inf=    3  time= 0:00
   22  it =     2  nf =      21  nj =     2  F = 0.3D+02  inf=    3  time= 0:00
   23  it =     5  nf =      32  nj =     5  F = 0.3D+02  inf=    3  time= 0:00
   24  it =     2  nf =      19  nj =     2  F = 0.5D+00  inf=    3  time= 0:00
   25  it =     0  nf =       2  nj =     1  F = 0.2D+02  inf=    2  time= 0:00
   26  it =    17  nf =      73  nj =    17  F = 0.8D-01  inf=    3  time= 0:01
   27  it =    10  nf =      16  nj =    10  F = 0.3D-13  inf=    0  time= 0:00
   28  it =    27  nf =      43  nj =    27  F = 0.0D+00  inf=    0  time= 0:00
   29  it =    13  nf =      15  nj =    13  F = 0.4D-08  inf=    0  time= 0:00
   30  it =     5  nf =      13  nj =     5  F = 0.6D-09  inf=    0  time= 0:00
   31  it =     4  nf =      21  nj =     4  F = 0.1D+01  inf=    3  time= 0:00
   32  it =     4  nf =      21  nj =     4  F = 0.3D+01  inf=    3  time= 0:00
   33  it =    10  nf =      16  nj =    10  F = 0.3D-13  inf=    0  time= 0:00
   34  it =    13  nf =     107  nj =    13  F = 0.2D+00  inf=    3  time= 0:00
   35  it =     3  nf =       5  nj =     3  F = 0.7D-10  inf=    0  time= 0:00
   36  it =     7  nf =      10  nj =     7  F = 0.3D-08  inf=    0  time= 0:00
   37  it =     0  nf =       2  nj =     1  F = 0.7D+01  inf=    2  time= 0:00
   38  it =    16  nf =      18  nj =    16  F = 0.3D-08  inf=    0  time= 0:00
   39  it =    27  nf =      43  nj =    27  F = 0.0D+00  inf=    0  time= 0:00
   40  it =    12  nf =      27  nj =    12  F = 0.6D-10  inf=    0  time= 0:00
   41  it =    13  nf =      20  nj =    13  F = 0.7D-13  inf=    0  time= 0:00
   42  it =     5  nf =       7  nj =     5  F = 0.8D-13  inf=    0  time= 0:00
   43  it =    12  nf =      14  nj =    12  F = 0.0D+00  inf=    0  time= 0:00
   44  it =    17  nf =      19  nj =    17  F = 0.7D-09  inf=    0  time= 0:00
   45  it =     0  nf =       2  nj =     1  F = 0.1D+01  inf=    2  time= 0:00
   46  it =     4  nf =       6  nj =     4  F = 0.2D-11  inf=    0  time= 0:00
   47  it =     5  nf =       7  nj =     5  F = 0.9D-09  inf=    0  time= 0:00
   48  it =    13  nf =      16  nj =    13  F = 0.2D-14  inf=    0  time= 0:00
   49  it =    15  nf =      25  nj =    15  F = 0.6D-14  inf=    0  time= 0:00
   50  it =    24  nf =     173  nj =    24  F = 0.6D+00  inf=    3  time= 0:00
   51  it =     2  nf =       4  nj =     2  F = 0.2D-09  inf=    0  time= 0:00
   52  it =     9  nf =      14  nj =     9  F = 0.8D-08  inf=    0  time= 0:00
   53  it =    13  nf =      15  nj =    13  F = 0.5D-15  inf=    0  time= 0:00
   54  it =     7  nf =      26  nj =     7  F = 0.1D-11  inf=    0  time= 0:00
   55  it =    11  nf =     105  nj =    11  F = 0.8D+00  inf=    3  time= 0:00
   56  it =     9  nf =      58  nj =     9  F = 0.3D-03  inf=    3  time= 0:00
   57  it =     4  nf =       6  nj =     4  F = 0.9D-15  inf=    0  time= 0:00
   58  it =     9  nf =      11  nj =     9  F = 0.1D-12  inf=    0  time= 0:00
   59  it =     8  nf =      10  nj =     8  F = 0.5D-10  inf=    0  time= 0:00
   60  it =     9  nf =      23  nj =     9  F = 0.7D-14  inf=    0  time= 0:01
   61  it =    15  nf =      17  nj =    15  F = 0.1D-08  inf=    0  time= 0:00
   62  it =     8  nf =      17  nj =     8  F = 0.5D-09  inf=    0  time= 0:00
------------------------------------------------------------------------------
Total  it =   573  nf =    1871  nj =   579      succesful =  38     time= 0:05
```

```
Test for subroutine dson4:    200  variables
------------------------------------------------------------------------------
   1  it =    11  nf =      39  nj =    11  F = 0.0D+00  inf=    0  time= 0:00
   2  it =    17  nf =      19  nj =    17  F = 0.7D-09  inf=    0  time= 0:00
   3  it =    84  nf =     601  nj =    84  F = 0.6D-02  inf=    3  time= 0:16
   4          failed due to invalid operation
   5  it =    18  nf =      20  nj =    18  F = 0.0D+00  inf=    0  time= 0:04
   6  it =    19  nf =      94  nj =    19  F = 0.2D-10  inf=    0  time= 0:03
   7  it =     0  nf =       2  nj =     1  F = 0.1D+03  inf=    2  time= 0:00
   8  it =     2  nf =       4  nj =     2  F = 0.5D-10  inf=    0  time= 0:00
   9  it =     3  nf =       5  nj =     3  F = 0.3D-14  inf=    0  time= 0:01
  10  it =     4  nf =       6  nj =     4  F = 0.8D-09  inf=    0  time= 0:00
  11  it =     7  nf =      33  nj =     7  F = 0.4D+01  inf=    3  time= 0:01
  12  it =     4  nf =      26  nj =     4  F = 0.3D+01  inf=    3  time= 0:00
  13  it =    12  nf =      14  nj =    13  F = 0.8D-06  inf=    0  time= 0:02
  14  it =     0  nf =       2  nj =     1  F = 0.3D+02  inf=    2  time= 0:00
  15  it =     5  nf =       7  nj =     5  F = 0.5D-15  inf=    0  time= 0:00
  16  it =     5  nf =       7  nj =     5  F = 0.9D-09  inf=    0  time= 0:00
  17  it =     3  nf =      20  nj =     3  F = 0.1D+02  inf=    3  time= 0:01
  18  it =    13  nf =      38  nj =    14  F = 0.2D-01  inf=    2  time= 0:04
  19  it =     7  nf =      25  nj =     7  F = 0.2D+01  inf=    3  time= 0:02
  20  it =   226  nf =    2752  nj =   226  F = 0.7D+00  inf=    3  time= 0:29
  21  it =     7  nf =      45  nj =     7  F = 0.8D+01  inf=    3  time= 0:01
  22  it =     2  nf =      21  nj =     2  F = 0.3D+02  inf=    3  time= 0:01
  23  it =     5  nf =      32  nj =     5  F = 0.3D+02  inf=    3  time= 0:00
  24  it =     2  nf =      19  nj =     2  F = 0.6D+00  inf=    3  time= 0:01
  25  it =     0  nf =       2  nj =     1  F = 0.2D+02  inf=    2  time= 0:00
  26  it =    13  nf =      62  nj =    13  F = 0.2D+00  inf=    3  time= 0:01
  27  it =    10  nf =      14  nj =    10  F = 0.2D-11  inf=    0  time= 0:00
  28  it =    37  nf =      67  nj =    37  F = 0.3D-08  inf=    0  time= 0:01
  29  it =    13  nf =      15  nj =    13  F = 0.4D-08  inf=    0  time= 0:00
  30  it =     6  nf =      17  nj =     6  F = 0.2D-09  inf=    0  time= 0:00
  31  it =     4  nf =      21  nj =     4  F = 0.1D+01  inf=    3  time= 0:00
  32  it =     4  nf =      21  nj =     4  F = 0.3D+01  inf=    3  time= 0:01
  33  it =    10  nf =      14  nj =    10  F = 0.2D-11  inf=    0  time= 0:00
  34  it =    23  nf =      99  nj =    23  F = 0.8D-12  inf=    0  time= 0:00
  35  it =     3  nf =       5  nj =     3  F = 0.1D-09  inf=    0  time= 0:00
  36  it =     7  nf =      10  nj =     7  F = 0.3D-08  inf=    0  time= 0:00
  37  it =     0  nf =       2  nj =     1  F = 0.7D+01  inf=    2  time= 0:00
  38  it =    16  nf =      18  nj =    16  F = 0.3D-08  inf=    0  time= 0:00
  39  it =    37  nf =      67  nj =    37  F = 0.3D-08  inf=    0  time= 0:01
  40  it =    13  nf =      31  nj =    13  F = 0.7D-11  inf=    0  time= 0:00
  41  it =    13  nf =      22  nj =    13  F = 0.3D-10  inf=    0  time= 0:00
  42  it =     5  nf =       7  nj =     5  F = 0.8D-13  inf=    0  time= 0:00
  43  it =    12  nf =      14  nj =    12  F = 0.0D+00  inf=    0  time= 0:00
  44  it =    17  nf =      19  nj =    17  F = 0.7D-09  inf=    0  time= 0:00
  45  it =     0  nf =       2  nj =     1  F = 0.1D+01  inf=    2  time= 0:00
  46  it =     4  nf =       6  nj =     4  F = 0.2D-11  inf=    0  time= 0:00
  47  it =     5  nf =       7  nj =     5  F = 0.9D-09  inf=    0  time= 0:00
  48  it =    13  nf =      16  nj =    13  F = 0.2D-14  inf=    0  time= 0:00
  49  it =    15  nf =      25  nj =    15  F = 0.6D-14  inf=    0  time= 0:00
  50  it =    62  nf =     428  nj =    62  F = 0.5D+00  inf=    3  time= 0:01
  51  it =     2  nf =       4  nj =     2  F = 0.5D-10  inf=    0  time= 0:00
  52  it =    10  nf =      15  nj =    10  F = 0.8D-10  inf=    0  time= 0:00
  53  it =    12  nf =      14  nj =    12  F = 0.6D-09  inf=    0  time= 0:00
  54  it =     7  nf =      26  nj =     7  F = 0.3D-10  inf=    0  time= 0:00
  55  it =    11  nf =     111  nj =    11  F = 0.8D+00  inf=    3  time= 0:00
  56  it =     8  nf =      10  nj =     8  F = 0.2D-09  inf=    0  time= 0:01
  57  it =     4  nf =       6  nj =     4  F = 0.7D-15  inf=    0  time= 0:00
  58  it =     8  nf =      10  nj =     8  F = 0.2D-08  inf=    0  time= 0:00
  59  it =     8  nf =      10  nj =     8  F = 0.8D-10  inf=    0  time= 0:00
  60  it =    10  nf =      27  nj =    10  F = 0.7D-14  inf=    0  time= 0:00
  61  it =    14  nf =      16  nj =    14  F = 0.1D-08  inf=    0  time= 0:00
  62  it =     8  nf =      20  nj =     8  F = 0.4D-12  inf=    0  time= 0:01
------------------------------------------------------------------------------
Total  it =   900  nf =    5111  nj =   907      succesful =  40     time= 1:13
```

```
Test for subroutine gsgm7:    100  variables
------------------------------------------------------------------------------
    1  it =    12  nf =     15  nj =    13  F = 0.0D+00  inf=    3  time= 0:00
    2  it =    12  nf =     13  nj =    13  F = 0.4D-05  inf=    4  time= 0:01
    3  it =    19  nf =     26  nj =    20  F = 0.2D-01  inf=    4  time= 0:00
    4  it =    64  nf =     72  nj =    65  F = 0.2D+03  inf=    2  time= 0:03
    5  it =    16  nf =     17  nj =    17  F = 0.0D+00  inf=    3  time= 0:00
    6  it =    26  nf =     39  nj =    27  F = 0.6D-03  inf=    2  time= 0:01
    7  it =     7  nf =      8  nj =     8  F = 0.7D-10  inf=    3  time= 0:01
    8  it =    14  nf =     15  nj =    15  F = 0.4D-06  inf=    4  time= 0:00
    9  it =     3  nf =      4  nj =     4  F = 0.1D-13  inf=    3  time= 0:00
   10  it =     5  nf =      6  nj =     6  F = 0.2D-14  inf=    3  time= 0:00
   11  it =   166  nf =    169  nj =   167  F = 0.5D-14  inf=    3  time= 0:06
   12  it =    65  nf =     77  nj =    66  F = 0.3D-12  inf=    3  time= 0:03
   13  it =    12  nf =     13  nj =    13  F = 0.1D-05  inf=    4  time= 0:00
   14  it =    33  nf =     35  nj =    34  F = 0.4D+01  inf=    2  time= 0:02
   15  it =     4  nf =      5  nj =     5  F = 0.8D-08  inf=    3  time= 0:00
   16  it =     5  nf =      6  nj =     6  F = 0.1D-08  inf=    3  time= 0:00
   17  it =    16  nf =     20  nj =    17  F = 0.8D+02  inf=    2  time= 0:01
   18  it =    15  nf =     18  nj =    16  F = 0.2D-04  inf=    4  time= 0:01
   19  it =    23  nf =     30  nj =    24  F = 0.1D+02  inf=    2  time= 0:01
   20  it =    20  nf =     29  nj =    21  F = 0.4D+01  inf=    2  time= 0:01
   21  it =   310  nf =    315  nj =   311  F = 0.0D+00  inf=    3  time= 0:11
   22  it =    37  nf =     45  nj =    38  F = 0.5D+02  inf=    2  time= 0:01
   23  it =    21  nf =     30  nj =    22  F = 0.1D+03  inf=    2  time= 0:01
   24  it =    16  nf =     17  nj =    17  F = 0.3D+01  inf=    4  time= 0:02
   25  it =     7  nf =      9  nj =     8  F = 0.1D+01  inf=    4  time= 0:00
   26  it =    16  nf =     21  nj =    17  F = 0.5D+00  inf=    4  time= 0:01
   27  it =     8  nf =      9  nj =     9  F = 0.2D-07  inf=    4  time= 0:00
   28  it =   196  nf =    203  nj =   197  F = 0.3D-09  inf=    3  time= 0:05
   29  it =    21  nf =     24  nj =    22  F = 0.2D-06  inf=    2  time= 0:01
   30  it =    15  nf =     16  nj =    16  F = 0.3D-13  inf=    3  time= 0:01
   31  it =    20  nf =     24  nj =    21  F = 0.8D+01  inf=    2  time= 0:00
   32  it =    66  nf =     78  nj =    67  F = 0.2D+02  inf=    2  time= 0:03
   33  it =     8  nf =      9  nj =     9  F = 0.2D-07  inf=    4  time= 0:00
   34  it =    10  nf =     12  nj =    11  F = 0.8D-13  inf=    3  time= 0:00
   35  it =     3  nf =      4  nj =     4  F = 0.2D-09  inf=    3  time= 0:00
   36  it =    19  nf =     30  nj =    20  F = 0.3D+01  inf=    2  time= 0:01
   37  it =   192  nf =    231  nj =   193  F = 0.2D+02  inf=    2  time= 0:08
   38  it =    14  nf =     15  nj =    15  F = 0.3D-05  inf=    4  time= 0:00
   39  it =   472  nf =    480  nj =   473  F = 0.5D-08  inf=    3  time= 0:12
   40  it =    51  nf =     65  nj =    52  F = 0.7D+00  inf=    4  time= 0:02
   41  it =    46  nf =     59  nj =    47  F = 0.6D+00  inf=    4  time= 0:02
   42  it =     7  nf =      8  nj =     8  F = 0.1D-09  inf=    3  time= 0:00
   43  it =    12  nf =     13  nj =    13  F = 0.0D+00  inf=    3  time= 0:00
   44  it =    12  nf =     13  nj =    13  F = 0.4D-05  inf=    4  time= 0:00
   45  it =    14  nf =     15  nj =    15  F = 0.5D-05  inf=    4  time= 0:01
   46  it =     6  nf =      7  nj =     7  F = 0.2D-10  inf=    3  time= 0:00
   47  it =     5  nf =      6  nj =     6  F = 0.1D-08  inf=    3  time= 0:00
   48  it =    33  nf =     34  nj =    34  F = 0.3D-10  inf=    3  time= 0:01
   49  it =    10  nf =     12  nj =    11  F = 0.2D-08  inf=    3  time= 0:00
   50  it =    24  nf =     30  nj =    25  F = 0.1D-01  inf=    4  time= 0:01
   51  it =    14  nf =     15  nj =    15  F = 0.4D-06  inf=    4  time= 0:00
   52  it =    11  nf =     13  nj =    12  F = 0.2D-10  inf=    3  time= 0:01
   53  it =    12  nf =     13  nj =    13  F = 0.7D-08  inf=    3  time= 0:00
   54  it =    91  nf =    124  nj =    92  F = 0.3D+00  inf=    4  time= 0:05
   55  it =    77  nf =     82  nj =    78  F = 0.2D-09  inf=    3  time= 0:04
   56  it =    13  nf =     17  nj =    14  F = 0.6D-03  inf=    4  time= 0:00
   57  it =     5  nf =      6  nj =     6  F = 0.2D-07  inf=    4  time= 0:00
   58  it =    12  nf =     13  nj =    13  F = 0.4D-12  inf=    3  time= 0:01
   59  it =    10  nf =     11  nj =    11  F = 0.2D-09  inf=    3  time= 0:00
   60  it =    12  nf =     15  nj =    13  F = 0.9D-11  inf=    3  time= 0:00
   61  it =    20  nf =     21  nj =    21  F = 0.9D-08  inf=    3  time= 0:01
   62  it =    22  nf =     26  nj =    23  F = 0.6D-10  inf=    3  time= 0:00
------------------------------------------------------------------------------
Total  it =  2507  nf =   2807  nj =  2569      succesful =  62     time= 1:27
```

Test for subroutine gsgm7: 200 variables

1	it =	12	nf =	15	nj =	13	F = 0.3D-14	inf=	3	time= 0:03
2	it =	12	nf =	13	nj =	13	F = 0.6D-05	inf=	4	time= 0:02
3	it =	26	nf =	31	nj =	27	F = 0.3D-01	inf=	4	time= 0:05
4	it =	53	nf =	55	nj =	54	F = 0.5D+07	inf=	2	time= 0:12
5	it =	18	nf =	19	nj =	19	F = 0.0D+00	inf=	3	time= 0:03
6	it =	32	nf =	47	nj =	33	F = 0.3D-03	inf=	4	time= 0:13
7	it =	14	nf =	16	nj =	15	F = 0.6D-08	inf=	3	time= 0:03
8	it =	14	nf =	15	nj =	15	F = 0.2D-03	inf=	4	time= 0:05
9	it =	3	nf =	4	nj =	4	F = 0.2D-13	inf=	3	time= 0:00
10	it =	5	nf =	6	nj =	6	F = 0.2D-14	inf=	3	time= 0:01
11	it =	325	nf =	328	nj =	326	F = 0.7D-11	inf=	3	time= 1:28
12	it =	202	nf =	251	nj =	203	F = 0.4D+01	inf=	2	time= 1:20
13	it =	12	nf =	13	nj =	13	F = 0.1D-05	inf=	4	time= 0:03
14	it =	39	nf =	41	nj =	40	F = 0.5D+01	inf=	2	time= 0:13
15	it =	4	nf =	5	nj =	5	F = 0.1D-07	inf=	4	time= 0:01
16	it =	5	nf =	6	nj =	6	F = 0.1D-08	inf=	3	time= 0:00
17	it =	13	nf =	48	nj =	13	F = 0.1D+03	inf=	6	time= 0:06
18	it =	22	nf =	28	nj =	23	F = 0.6D-04	inf=	4	time= 0:20
19	it =	24	nf =	31	nj =	25	F = 0.2D+02	inf=	2	time= 0:08
20	it =	32	nf =	41	nj =	33	F = 0.6D+01	inf=	2	time= 0:10
21	it =	612	nf =	619	nj =	613	F = 0.2D-09	inf=	3	time= 2:47
22	it =	48	nf =	53	nj =	49	F = 0.7D+02	inf=	2	time= 0:18
23	it =	29	nf =	67	nj =	29	F = 0.2D+03	inf=	6	time= 0:12
24	it =	9	nf =	12	nj =	10	F = 0.5D+01	inf=	4	time= 0:04
25	it =	7	nf =	40	nj =	7	F = 0.2D+01	inf=	6	time= 0:06
26	it =	19	nf =	24	nj =	20	F = 0.7D+00	inf=	4	time= 0:08
27	it =	9	nf =	10	nj =	10	F = 0.6D-11	inf=	3	time= 0:02
28	it =	409	nf =	418	nj =	410	F = 0.1D-14	inf=	3	time= 1:23
29	it =	21	nf =	25	nj =	22	F = 0.3D-06	inf=	2	time= 0:04
30	it =	18	nf =	21	nj =	19	F = 0.1D-08	inf=	3	time= 0:05
31	it =	19	nf =	24	nj =	20	F = 0.1D+02	inf=	2	time= 0:06
32	it =	52	nf =	65	nj =	53	F = 0.3D+02	inf=	2	time= 0:15
33	it =	9	nf =	10	nj =	10	F = 0.6D-11	inf=	3	time= 0:02
34	it =	8	nf =	10	nj =	9	F = 0.1D-07	inf=	4	time= 0:01
35	it =	3	nf =	4	nj =	4	F = 0.3D-09	inf=	3	time= 0:01
36	it =	33	nf =	77	nj =	33	F = 0.3D+01	inf=	6	time= 0:12
37	it =	425	nf =	499	nj =	426	F = 0.3D+02	inf=	2	time= 2:36
38	it =	13	nf =	14	nj =	14	F = 0.3D-05	inf=	4	time= 0:02
39	it =	238	nf =	244	nj =	239	F = 0.2D-08	inf=	3	time= 0:48
40	it =	58	nf =	114	nj =	58	F = 0.7D+00	inf=	6	time= 0:22
41	it =	45	nf =	57	nj =	46	F = 0.6D+00	inf=	4	time= 0:13
42	it =	8	nf =	9	nj =	9	F = 0.1D-10	inf=	3	time= 0:02
43	it =	12	nf =	13	nj =	13	F = 0.0D+00	inf=	3	time= 0:02
44	it =	12	nf =	13	nj =	13	F = 0.6D-05	inf=	4	time= 0:02
45	it =	14	nf =	15	nj =	15	F = 0.7D-05	inf=	4	time= 0:03
46	it =	6	nf =	7	nj =	7	F = 0.2D-11	inf=	3	time= 0:01
47	it =	5	nf =	6	nj =	6	F = 0.1D-08	inf=	3	time= 0:01
48	it =	33	nf =	34	nj =	34	F = 0.5D-10	inf=	3	time= 0:06
49	it =	10	nf =	12	nj =	11	F = 0.3D-08	inf=	3	time= 0:02
50	it =	19	nf =	20	nj =	20	F = 0.1D-08	inf=	3	time= 0:06
51	it =	14	nf =	15	nj =	15	F = 0.2D-03	inf=	4	time= 0:04
52	it =	14	nf =	17	nj =	15	F = 0.9D-11	inf=	3	time= 0:05
53	it =	11	nf =	12	nj =	12	F = 0.1D-04	inf=	4	time= 0:01
54	it =	94	nf =	122	nj =	95	F = 0.1D+00	inf=	4	time= 0:44
55	it =	100	nf =	104	nj =	101	F = 0.3D-07	inf=	4	time= 0:33
56	it =	14	nf =	15	nj =	15	F = 0.2D-08	inf=	3	time= 0:03
57	it =	6	nf =	7	nj =	7	F = 0.2D-11	inf=	3	time= 0:01
58	it =	13	nf =	14	nj =	14	F = 0.2D-11	inf=	3	time= 0:03
59	it =	10	nf =	11	nj =	11	F = 0.3D-08	inf=	3	time= 0:01
60	it =	11	nf =	13	nj =	12	F = 0.6D-14	inf=	3	time= 0:02
61	it =	21	nf =	22	nj =	22	F = 0.8D-08	inf=	3	time= 0:04
62	it =	30	nf =	37	nj =	31	F = 0.3D-11	inf=	3	time= 0:09
Total	it =	3408	nf =	3938	nj =	3353	succesful =	62		time=16:38

```
Test for subroutine gsgm7_d:    100  variables
-------------------------------------------------------------------------------
   1  it =    12  nf =    1315  nj =     0  F = 0.6D-14  inf=    3  time= 0:00
   2  it =    12  nf =    1313  nj =     0  F = 0.4D-05  inf=    4  time= 0:01
   3  it =    23  nf =    2429  nj =     0  F = 0.2D-01  inf=    4  time= 0:01
   4  it =    73  nf =    7487  nj =     0  F = 0.2D+03  inf=    2  time= 0:04
   5  it =    16  nf =    1717  nj =     0  F = 0.2D-12  inf=    3  time= 0:01
   6  it =    34  nf =    3548  nj =     0  F = 0.6D-03  inf=    4  time= 0:08
   7  it =    15  nf =    1617  nj =     0  F = 0.7D-08  inf=    3  time= 0:01
   8  it =    14  nf =    1515  nj =     0  F = 0.4D-06  inf=    4  time= 0:00
   9  it =     3  nf =     404  nj =     0  F = 0.2D-13  inf=    3  time= 0:01
  10  it =     5  nf =     606  nj =     0  F = 0.3D-14  inf=    3  time= 0:00
  11  it =   166  nf =   16869  nj =     0  F = 0.1D-13  inf=    3  time= 0:08
  12  it =    65  nf =    6678  nj =     0  F = 0.7D-08  inf=    3  time= 0:04
  13  it =    12  nf =    1313  nj =     0  F = 0.1D-05  inf=    4  time= 0:01
  14  it =    23  nf =    2426  nj =     0  F = 0.4D+01  inf=    2  time= 0:01
  15  it =     4  nf =     505  nj =     0  F = 0.8D-08  inf=    3  time= 0:00
  16  it =     5  nf =     606  nj =     0  F = 0.1D-08  inf=    3  time= 0:00
  17  it =    16  nf =    1720  nj =     0  F = 0.8D+02  inf=    2  time= 0:01
  18  it =    15  nf =    1618  nj =     0  F = 0.2D-04  inf=    4  time= 0:02
  19  it =    23  nf =    2430  nj =     0  F = 0.1D+02  inf=    2  time= 0:02
  20  it =    20  nf =    2127  nj =     0  F = 0.4D+01  inf=    2  time= 0:01
  21  it =   310  nf =   31415  nj =     0  F = 0.2D-14  inf=    3  time= 0:15
  22  it =    37  nf =    3769  nj =     0  F = 0.5D+02  inf=    2  time= 0:03
  23  it =    21  nf =    2190  nj =     0  F = 0.1D+03  inf=    2  time= 0:01
  24  it =     9  nf =    1027  nj =     0  F = 0.3D+01  inf=    2  time= 0:02
  25  it =    12  nf =    1316  nj =     0  F = 0.1D+01  inf=    2  time= 0:01
  26  it =    28  nf =    2945  nj =     0  F = 0.5D+00  inf=    2  time= 0:03
  27  it =     8  nf =     909  nj =     0  F = 0.2D-07  inf=    4  time= 0:01
  28  it =   195  nf =   19801  nj =     0  F = 0.4D-08  inf=    3  time= 0:06
  29  it =     7  nf =     808  nj =     0  F = 0.1D-09  inf=    3  time= 0:00
  30  it =    15  nf =    1616  nj =     0  F = 0.4D-13  inf=    3  time= 0:01
  31  it =    20  nf =    2084  nj =     0  F = 0.8D+01  inf=    2  time= 0:01
  32  it =    66  nf =    6782  nj =     0  F = 0.2D+02  inf=    2  time= 0:03
  33  it =     8  nf =     909  nj =     0  F = 0.2D-07  inf=    4  time= 0:01
  34  it =    10  nf =    1112  nj =     0  F = 0.8D-13  inf=    3  time= 0:00
  35  it =     3  nf =     404  nj =     0  F = 0.2D-09  inf=    3  time= 0:00
  36  it =    19  nf =    2029  nj =     0  F = 0.3D+01  inf=    2  time= 0:01
  37  it =   304  nf =   30535  nj =     0  F = 0.2D+02  inf=    2  time= 0:15
  38  it =    14  nf =    1515  nj =     0  F = 0.3D-05  inf=    4  time= 0:00
  39  it =   473  nf =   47881  nj =     0  F = 0.9D-10  inf=    3  time= 0:15
  40  it =    63  nf =    6475  nj =     0  F = 0.7D+00  inf=    2  time= 0:03
  41  it =    47  nf =    4861  nj =     0  F = 0.6D+00  inf=    2  time= 0:02
  42  it =     7  nf =     808  nj =     0  F = 0.1D-09  inf=    3  time= 0:00
  43  it =    12  nf =    1313  nj =     0  F = 0.3D-13  inf=    3  time= 0:01
  44  it =    12  nf =    1313  nj =     0  F = 0.4D-05  inf=    4  time= 0:00
  45  it =    14  nf =    1516  nj =     0  F = 0.9D-05  inf=    4  time= 0:01
  46  it =     6  nf =     707  nj =     0  F = 0.2D-10  inf=    3  time= 0:00
  47  it =     5  nf =     606  nj =     0  F = 0.1D-08  inf=    3  time= 0:00
  48  it =    33  nf =    3434  nj =     0  F = 0.3D-10  inf=    3  time= 0:01
  49  it =    10  nf =    1112  nj =     0  F = 0.2D-08  inf=    3  time= 0:00
  50  it =    24  nf =    2531  nj =     0  F = 0.1D-01  inf=    4  time= 0:01
  51  it =    14  nf =    1515  nj =     0  F = 0.4D-06  inf=    4  time= 0:01
  52  it =    11  nf =    1213  nj =     0  F = 0.2D-09  inf=    3  time= 0:01
  53  it =    12  nf =    1313  nj =     0  F = 0.7D-08  inf=    3  time= 0:00
  54  it =    85  nf =    8712  nj =     0  F = 0.3D+00  inf=    4  time= 0:05
  55  it =    77  nf =    7882  nj =     0  F = 0.2D-09  inf=    3  time= 0:04
  56  it =    13  nf =    1417  nj =     0  F = 0.6D-03  inf=    4  time= 0:01
  57  it =     5  nf =     606  nj =     0  F = 0.2D-07  inf=    4  time= 0:00
  58  it =    12  nf =    1313  nj =     0  F = 0.1D-10  inf=    3  time= 0:00
  59  it =    10  nf =    1111  nj =     0  F = 0.2D-09  inf=    3  time= 0:01
  60  it =    12  nf =    1315  nj =     0  F = 0.9D-11  inf=    3  time= 0:00
  61  it =     9  nf =    1010  nj =     0  F = 0.1D-08  inf=    3  time= 0:01
  62  it =    22  nf =    2326  nj =     0  F = 0.6D-10  inf=    3  time= 0:01
-------------------------------------------------------------------------------
Total  it =  2630  nf =  271699  nj =     0      succesful =  62     time= 2:10
```

```
Test for subroutine gsgm7_d:    200  variables
-------------------------------------------------------------------------------
    1  it =    12  nf =    2615  nj =     0  F = 0.2D-14  inf=    3  time= 0:04
    2  it =    12  nf =    2613  nj =     0  F = 0.6D-05  inf=    4  time= 0:02
    3  it =    28  nf =    5835  nj =     0  F = 0.3D-01  inf=    4  time= 0:07
    4  it =    23  nf =    4659  nj =     0  F = 0.5D+07  inf=    6  time= 0:12
    5  it =    18  nf =    3819  nj =     0  F = 0.4D-11  inf=    3  time= 0:03
    6  it =    32  nf =    6649  nj =     0  F = 0.3D-03  inf=    2  time= 1:07
    7  it =    15  nf =    3217  nj =     0  F = 0.1D-09  inf=    3  time= 0:05
    8  it =    14  nf =    3015  nj =     0  F = 0.2D-03  inf=    4  time= 0:05
    9  it =     3  nf =     804  nj =     0  F = 0.5D-13  inf=    3  time= 0:03
   10  it =     5  nf =    1206  nj =     0  F = 0.3D-14  inf=    3  time= 0:01
   11  it =   325  nf =   65528  nj =     0  F = 0.7D-11  inf=    3  time= 1:47
   12  it =   241  nf =   48703  nj =     0  F = 0.6D+01  inf=    2  time= 2:01
   13  it =    12  nf =    2613  nj =     0  F = 0.1D-05  inf=    4  time= 0:03
   14  it =    22  nf =    4624  nj =     0  F = 0.5D+01  inf=    2  time= 0:09
   15  it =     4  nf =    1005  nj =     0  F = 0.1D-07  inf=    4  time= 0:01
   16  it =     5  nf =    1206  nj =     0  F = 0.1D-08  inf=    3  time= 0:01
   17  it =    13  nf =    2817  nj =     0  F = 0.1D+03  inf=    2  time= 0:05
   18  it =    19  nf =    4025  nj =     0  F = 0.2D-04  inf=    4  time= 0:22
   19  it =    23  nf =    4826  nj =     0  F = 0.2D+02  inf=    2  time= 0:10
   20  it =    32  nf =    6641  nj =     0  F = 0.6D+01  inf=    2  time= 0:13
   21  it =   497  nf =  100104  nj =     0  F = 0.6D+01  inf=   11  time= 2:47
   22  it =    49  nf =   10060  nj =     0  F = 0.7D+02  inf=    2  time= 0:22
   23  it =    29  nf =    6036  nj =     0  F = 0.2D+03  inf=    2  time= 0:12
   24  it =    11  nf =    2416  nj =     0  F = 0.5D+01  inf=    2  time= 0:10
   25  it =    13  nf =    2823  nj =     0  F = 0.2D+01  inf=    2  time= 0:10
   26  it =    23  nf =    4668  nj =     0  F = 0.7D+00  inf=    6  time= 0:22
   27  it =     9  nf =    2010  nj =     0  F = 0.6D-11  inf=    3  time= 0:02
   28  it =   410  nf =   82619  nj =     0  F = 0.7D-09  inf=    3  time= 1:36
   29  it =     8  nf =    1809  nj =     0  F = 0.1D-10  inf=    3  time= 0:02
   30  it =    18  nf =    3821  nj =     0  F = 0.1D-08  inf=    3  time= 0:06
   31  it =    19  nf =    4032  nj =     0  F = 0.1D+02  inf=    2  time= 0:07
   32  it =    53  nf =   10868  nj =     0  F = 0.3D+02  inf=    2  time= 0:20
   33  it =     9  nf =    2010  nj =     0  F = 0.6D-11  inf=    3  time= 0:02
   34  it =     8  nf =    1810  nj =     0  F = 0.1D-07  inf=    4  time= 0:02
   35  it =     3  nf =     804  nj =     0  F = 0.3D-09  inf=    3  time= 0:01
   36  it =    33  nf =    6677  nj =     0  F = 0.3D+01  inf=    6  time= 0:14
   37  it =   403  nf =   80890  nj =     0  F = 0.3D+02  inf=    2  time= 2:18
   38  it =    13  nf =    2814  nj =     0  F = 0.3D-05  inf=    4  time= 0:03
   39  it =   238  nf =   48044  nj =     0  F = 0.2D-08  inf=    3  time= 0:55
   40  it =   114  nf =   23129  nj =     0  F = 0.7D+00  inf=    2  time= 0:38
   41  it =    48  nf =    9867  nj =     0  F = 0.6D+00  inf=    4  time= 0:17
   42  it =     8  nf =    1809  nj =     0  F = 0.1D-10  inf=    3  time= 0:02
   43  it =    12  nf =    2613  nj =     0  F = 0.1D-13  inf=    3  time= 0:02
   44  it =    12  nf =    2613  nj =     0  F = 0.6D-05  inf=    4  time= 0:03
   45  it =    14  nf =    3016  nj =     0  F = 0.1D-04  inf=    4  time= 0:03
   46  it =     6  nf =    1407  nj =     0  F = 0.2D-11  inf=    3  time= 0:01
   47  it =     5  nf =    1206  nj =     0  F = 0.1D-08  inf=    3  time= 0:01
   48  it =    33  nf =    6834  nj =     0  F = 0.5D-10  inf=    3  time= 0:08
   49  it =    10  nf =    2212  nj =     0  F = 0.3D-08  inf=    3  time= 0:02
   50  it =    21  nf =    4422  nj =     0  F = 0.4D-08  inf=    3  time= 0:08
   51  it =    14  nf =    3015  nj =     0  F = 0.2D-03  inf=    4  time= 0:05
   52  it =    14  nf =    3017  nj =     0  F = 0.1D-09  inf=    3  time= 0:05
   53  it =    11  nf =    2412  nj =     0  F = 0.1D-04  inf=    4  time= 0:02
   54  it =    99  nf =   20129  nj =     0  F = 0.1D+00  inf=    4  time= 0:49
   55  it =   100  nf =   20304  nj =     0  F = 0.3D-07  inf=    4  time= 0:36
   56  it =    14  nf =    2955  nj =     0  F = 0.2D-08  inf=    3  time= 0:04
   57  it =     6  nf =    1379  nj =     0  F = 0.2D-11  inf=    3  time= 0:01
   58  it =    14  nf =    2955  nj =     0  F = 0.1D-08  inf=    3  time= 0:05
   59  it =    10  nf =    2167  nj =     0  F = 0.3D-08  inf=    3  time= 0:02
   60  it =    11  nf =    2365  nj =     0  F = 0.6D-14  inf=    3  time= 0:03
   61  it =    10  nf =    2167  nj =     0  F = 0.4D-08  inf=    3  time= 0:03
   62  it =    30  nf =    6113  nj =     0  F = 0.3D-11  inf=    3  time= 0:10
-------------------------------------------------------------------------------
Total  it =     0  nf =       0  nj =     0      succesful =  61     time=20:02
```

```
Test for subroutine qngq1_d:    100  variables
-------------------------------------------------------------------------------
    1  it =    23  nf =     326  nj =     0  F = 0.1D-08  inf=    3  time= 0:00
    2  it =    30  nf =     236  nj =     0  F = 0.4D-07  inf=    4  time= 0:00
    3  it =   118  nf =    1032  nj =     0  F = 0.2D-01  inf=    2  time= 0:01
    4  it =   688  nf =    7569  nj =     0  F = 0.2D+03  inf=    2  time= 0:14
    5  it =   112  nf =     313  nj =     0  F = 0.5D-08  inf=    3  time= 0:00
    6  it =   226  nf =    5375  nj =     0  F = 0.2D-03  inf=    2  time= 0:13
    7  it =     3  nf =     206  nj =     0  F = 0.7D-08  inf=    3  time= 0:00
    8  it =    15  nf =     115  nj =     0  F = 0.1D-05  inf=    4  time= 0:00
    9  it =     4  nf =     105  nj =     0  F = 0.1D-08  inf=    3  time= 0:01
   10  it =    12  nf =     113  nj =     0  F = 0.9D-08  inf=    3  time= 0:00
   11  it =   354  nf =    3075  nj =     0  F = 0.3D-08  inf=    3  time= 0:05
   12  it =   341  nf =    4684  nj =     0  F = 0.4D+01  inf=    2  time= 0:13
   13  it =   100  nf =     300  nj =     0  F = 0.3D-07  inf=    4  time= 0:01
   14  it =    79  nf =    1506  nj =     0  F = 0.4D+01  inf=    2  time= 0:03
   15  it =    13  nf =     114  nj =     0  F = 0.9D-09  inf=    3  time= 0:00
   16  it =    28  nf =     230  nj =     0  F = 0.5D-11  inf=    3  time= 0:00
   17  it =    60  nf =    1092  nj =     0  F = 0.8D+02  inf=    2  time= 0:02
   18  it =    89  nf =    2209  nj =     0  F = 0.7D-05  inf=    4  time= 0:12
   19  it =   273  nf =    2953  nj =     0  F = 0.1D+02  inf=    2  time= 0:09
   20  it =   309  nf =    6267  nj =     0  F = 0.4D+01  inf=    2  time= 0:10
   21  it =   658  nf =    4591  nj =     0  F = 0.3D-09  inf=    3  time= 0:09
   22  it =   107  nf =    1896  nj =     0  F = 0.5D+02  inf=    2  time= 0:02
   23  it =   100  nf =    1904  nj =     0  F = 0.1D+03  inf=    2  time= 0:03
   24  it =    47  nf =    1769  nj =     0  F = 0.3D+01  inf=    2  time= 0:04
   25  it =    34  nf =     448  nj =     0  F = 0.1D+01  inf=    2  time= 0:01
   26  it =  1000  nf =   17451  nj =     0  F = 0.5D+00  inf=   12  time= 0:31
   27  it =    20  nf =     323  nj =     0  F = 0.8D-08  inf=    3  time= 0:00
   28  it =    67  nf =     977  nj =     0  F = 0.8D-10  inf=    3  time= 0:01
   29  it =    17  nf =     118  nj =     0  F = 0.5D-08  inf=    3  time= 0:00
   30  it =    20  nf =     221  nj =     0  F = 0.2D-07  inf=    4  time= 0:00
   31  it =    73  nf =     966  nj =     0  F = 0.8D+01  inf=    2  time= 0:02
   32  it =   851  nf =   26008  nj =     0  F = 0.2D+02  inf=    2  time= 0:36
   33  it =    20  nf =     323  nj =     0  F = 0.8D-08  inf=    3  time= 0:00
   34  it =    89  nf =    1604  nj =     0  F = 0.9D-08  inf=    3  time= 0:01
   35  it =     6  nf =     107  nj =     0  F = 0.3D-08  inf=    3  time= 0:00
   36  it =    19  nf =     625  nj =     0  F = 0.8D-08  inf=    3  time= 0:00
   37  it =   119  nf =    1931  nj =     0  F = 0.5D-08  inf=    3  time= 0:02
   38  it =    45  nf =     458  nj =     0  F = 0.4D-06  inf=    4  time= 0:00
   39  it =    67  nf =     977  nj =     0  F = 0.8D-10  inf=    3  time= 0:01
   40  it =    53  nf =     459  nj =     0  F = 0.2D-08  inf=    3  time= 0:00
   41  it =    40  nf =     443  nj =     0  F = 0.2D-08  inf=    3  time= 0:00
   42  it =    17  nf =     118  nj =     0  F = 0.5D-08  inf=    3  time= 0:00
   43  it =    30  nf =     332  nj =     0  F = 0.7D-09  inf=    3  time= 0:01
   44  it =    30  nf =     236  nj =     0  F = 0.4D-07  inf=    4  time= 0:00
   45  it =    31  nf =     437  nj =     0  F = 0.3D-05  inf=    4  time= 0:00
   46  it =    12  nf =     113  nj =     0  F = 0.5D-08  inf=    3  time= 0:00
   47  it =    28  nf =     230  nj =     0  F = 0.5D-11  inf=    3  time= 0:00
   48  it =   121  nf =    1026  nj =     0  F = 0.2D-08  inf=    3  time= 0:01
   49  it =    60  nf =     464  nj =     0  F = 0.2D-09  inf=    3  time= 0:01
   50  it =    32  nf =     436  nj =     0  F = 0.1D-07  inf=    3  time= 0:00
   51  it =    15  nf =     115  nj =     0  F = 0.1D-05  inf=    4  time= 0:00
   52  it =    27  nf =     329  nj =     0  F = 0.2D-09  inf=    3  time= 0:00
   53  it =    28  nf =     330  nj =     0  F = 0.1D-06  inf=    4  time= 0:01
   54  it =    29  nf =     332  nj =     0  F = 0.1D-07  inf=    2  time= 0:00
   55  it =   524  nf =   12139  nj =     0  F = 0.1D-08  inf=    3  time= 0:07
   56  it =    84  nf =    1802  nj =     0  F = 0.6D-03  inf=    2  time= 0:01
   57  it =     7  nf =     108  nj =     0  F = 0.7D-08  inf=    3  time= 0:00
   58  it =    28  nf =     129  nj =     0  F = 0.4D-08  inf=    3  time= 0:00
   59  it =    23  nf =     326  nj =     0  F = 0.3D-08  inf=    3  time= 0:00
   60  it =    23  nf =     427  nj =     0  F = 0.5D-08  inf=    3  time= 0:00
   61  it =    11  nf =     112  nj =     0  F = 0.2D-14  inf=    3  time= 0:01
   62  it =    19  nf =     423  nj =     0  F = 0.2D-08  inf=    3  time= 0:00
-------------------------------------------------------------------------------
Total  it =  7508  nf =  121383  nj =     0      succesful =  60     time= 3:10
```

```
Test for subroutine qngq1_d:    200  variables
-------------------------------------------------------------------------------
    1  it =    23  nf =    626  nj =     0  F = 0.1D-08  inf=    3  time= 0:01
    2  it =    30  nf =    436  nj =     0  F = 0.6D-07  inf=    4  time= 0:02
    3  it =    74  nf =   1687  nj =     0  F = 0.3D-01  inf=    4  time= 0:04
    4  it =    41  nf =   1664  nj =     0  F = 0.5D+07  inf=    6  time= 0:10
    5  it =   484  nf =    888  nj =     0  F = 0.7D-09  inf=    3  time= 0:10
    6  it =   226  nf =  12483  nj =     0  F = 0.4D-03  inf=    2  time= 1:58
    7  it =     5  nf =    409  nj =     0  F = 0.5D-10  inf=    3  time= 0:01
    8  it =    18  nf =    218  nj =     0  F = 0.7D-07  inf=    4  time= 0:01
    9  it =     4  nf =    205  nj =     0  F = 0.1D-08  inf=    3  time= 0:01
   10  it =    13  nf =    214  nj =     0  F = 0.1D-08  inf=    3  time= 0:00
   11  it =   668  nf =  15314  nj =     0  F = 0.4D-08  inf=    3  time= 1:45
   12  it =   369  nf =   7602  nj =     0  F = 0.4D+01  inf=    2  time= 1:30
   13  it =    37  nf =    641  nj =     0  F = 0.1D-07  inf=    2  time= 0:04
   14  it =   118  nf =   3542  nj =     0  F = 0.5D+01  inf=    2  time= 0:32
   15  it =    13  nf =    214  nj =     0  F = 0.1D-08  inf=    3  time= 0:01
   16  it =    21  nf =    423  nj =     0  F = 0.6D-09  inf=    3  time= 0:01
   17  it =    73  nf =   2503  nj =     0  F = 0.1D+03  inf=    2  time= 0:16
   18  it =   105  nf =   4535  nj =     0  F = 0.7D-05  inf=    2  time= 2:26
   19  it =   259  nf =   5315  nj =     0  F = 0.2D+02  inf=    2  time= 1:03
   20  it =   337  nf =  13998  nj =     0  F = 0.6D+01  inf=    2  time= 1:33
   21  it =  1000  nf =  14849  nj =     0  F = 0.7D+01  inf=   12  time= 1:50
   22  it =    87  nf =   3912  nj =     0  F = 0.7D+02  inf=    2  time= 0:25
   23  it =    89  nf =   3524  nj =     0  F = 0.2D+03  inf=    2  time= 0:27
   24  it =    49  nf =   4269  nj =     0  F = 0.5D+01  inf=    2  time= 0:34
   25  it =    40  nf =    647  nj =     0  F = 0.2D+01  inf=    6  time= 0:05
   26  it =  1000  nf =  39371  nj =     0  F = 0.7D+00  inf=   12  time= 4:34
   27  it =    22  nf =    624  nj =     0  F = 0.6D-08  inf=    3  time= 0:01
   28  it =    87  nf =   2296  nj =     0  F = 0.2D-14  inf=    3  time= 0:06
   29  it =    18  nf =    219  nj =     0  F = 0.9D-08  inf=    3  time= 0:00
   30  it =    28  nf =    429  nj =     0  F = 0.4D-07  inf=    4  time= 0:02
   31  it =    73  nf =   1694  nj =     0  F = 0.1D+02  inf=    2  time= 0:14
   32  it =   664  nf =  39964  nj =     0  F = 0.3D+02  inf=    6  time= 4:11
   33  it =    22  nf =    624  nj =     0  F = 0.6D-08  inf=    3  time= 0:02
   34  it =   126  nf =   4144  nj =     0  F = 0.1D-08  inf=    3  time= 0:09
   35  it =     6  nf =    207  nj =     0  F = 0.2D-08  inf=    3  time= 0:01
   36  it =    61  nf =   4485  nj =     0  F = 0.3D+01  inf=    2  time= 0:09
   37  it =    72  nf =   2480  nj =     0  F = 0.3D-08  inf=    3  time= 0:05
   38  it =    57  nf =   1283  nj =     0  F = 0.1D-04  inf=    2  time= 0:04
   39  it =    87  nf =   2296  nj =     0  F = 0.2D-14  inf=    3  time= 0:05
   40  it =    61  nf =    865  nj =     0  F = 0.1D-09  inf=    3  time= 0:03
   41  it =  1000  nf =  42995  nj =     0  F = 0.6D+00  inf=   12  time= 1:35
   42  it =    18  nf =    219  nj =     0  F = 0.9D-08  inf=    3  time= 0:01
   43  it =    30  nf =    632  nj =     0  F = 0.9D-09  inf=    3  time= 0:02
   44  it =    30  nf =    436  nj =     0  F = 0.6D-07  inf=    4  time= 0:01
   45  it =    31  nf =    837  nj =     0  F = 0.4D-05  inf=    4  time= 0:02
   46  it =    12  nf =    213  nj =     0  F = 0.5D-08  inf=    3  time= 0:00
   47  it =    21  nf =    423  nj =     0  F = 0.6D-09  inf=    3  time= 0:01
   48  it =   121  nf =   1926  nj =     0  F = 0.3D-08  inf=    3  time= 0:06
   49  it =    60  nf =    864  nj =     0  F = 0.2D-09  inf=    3  time= 0:02
   50  it =    29  nf =   1035  nj =     0  F = 0.2D-09  inf=    3  time= 0:03
   51  it =    18  nf =    218  nj =     0  F = 0.7D-07  inf=    4  time= 0:00
   52  it =    24  nf =    627  nj =     0  F = 0.3D-09  inf=    3  time= 0:02
   53  it =    24  nf =    625  nj =     0  F = 0.1D-06  inf=    4  time= 0:02
   54  it =  1000  nf =  47205  nj =     0  F = 0.5D+00  inf=   12  time= 1:43
   55  it =  1000  nf =  43398  nj =     0  F = 0.3D-01  inf=   12  time= 1:37
   56  it =    17  nf =    214  nj =     0  F = 0.8D-08  inf=    3  time= 0:01
   57  it =     8  nf =    205  nj =     0  F = 0.8D-10  inf=    3  time= 0:00
   58  it =    27  nf =    224  nj =     0  F = 0.4D-08  inf=    3  time= 0:01
   59  it =    23  nf =    613  nj =     0  F = 0.5D-08  inf=    3  time= 0:02
   60  it =    25  nf =    813  nj =     0  F = 0.2D-08  inf=    3  time= 0:01
   61  it =    12  nf =    209  nj =     0  F = 0.2D-14  inf=    3  time= 0:01
   62  it =    31  nf =    622  nj =     0  F = 0.8D-08  inf=    3  time= 0:02
-------------------------------------------------------------------------------
Total  it = 10128  nf = 345652  nj =     0      succesful =  57     time=30:11
```