SOME EXTENSIONS OF CIMMINO'S REFLECTIONS ALGORITHM TO INCONSISTENT LINEAR LEAST-SQUARES PROBLEMS

Constantin Popa
Faculty of Mathematics and Computer Science, "Ovidius" University,
Blvd. Mamaia 124, 8700 Constanta, Romania
e-mail: cpopa@univ-ovidius.ro

Keywords: Cimmino's reflections iteration, Jacobi's projections algorithm, inconsistent linear least-squares problems

Abstract

In the paper [1] G. Cimmino presented for the first time his famous reflections algorithm. He proved there that, if the rank of the problem matrix is greather than one then, for any initial approximation the sequence generated by his algorithm converges to a solution of the normal equation associated to a perturbed (diagonally scalled) least- squares problem. Started from this result we construct a first extension of Cimmino's method which generates sequences of approximations of least-squares solutions for general inconsistent problems. This extension can be also obtained as a particular case of the iterative methods described in the paper [2].

The second extension of Cimmino's algorithm is obtained starting from author's results from [3]. In this sense, we prove that a particular case of Cimmino's method can be considered as a particular case of Jacobi's simultaneous projections. Thus, following the way from [3] we obtain the corresponding extension.

We also analyse and compare, from a computational point of view the two above mentioned extensions on some model problems.

References

[1] Cimmino G. Calcolo approssimato per le soluzioni dei sistemi di equazioni lineari, Ric. Sci. progr. tecn. econom. naz. I(1938), 326-333.

[2] Keller H. B. On the solution of singular and semidefinite linear systems by iteration, SIAM J. Numer. Anal., Ser. B, Vol. 2, No. 2(1965), 281-290.

[3] Popa C. Extensions of block-projections methods with relaxation parameters to inconsistent and rank-defficient least-squares problems, *B I T*, 38(1)(1998), 151-176.