ITERATIVE COMPUTING THE MINIMAL SOLUTION OF THE COUPLED NONLINEAR MATRIX EQUATIONS IN TERMS OF NONNEGATIVE MATRICES[*]

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Dedicated to Dr. Vasile Drăgan on the occasion of his 70th anniversary

Abstract

We investigate a set of nonlinear matrix equations with nonnegative matrix coefficients which has arisen in applied sciences. There are papers where the minimal nonnegative solution of the set of nonlinear matrix equations is computed applying the different procedures. The alternate linear implicit method and its modifications have intensively investigated because they have simple computational scheme. We construct a new decoupled modification of the alternate linear implicit procedure to compute the minimal nonnegative solution of the considered set of equations. The convergence properties of the proposed iteration are derived and a sufficient condition for convergence is derived. The performance of the proposed algorithm is illustrated on several numerical examples. On the basis of the experiments we derive conclusions for applicability of the computational schemes.

MSC: 15A24, 15A45, 60H35, 65C20.

keywords: M-matrix, decoupled iteration, numerical iterative methods, minimal nonnegative solution, decoupled iteration.