



ITERATION WITH STEPSIZE PARAMETER AND CONDITION NUMBERS FOR A NONLINEAR MATRIX EQUATION*

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Abstract. In this paper, the nonlinear matrix equation $X^p + A^T X A = Q$, where p is a positive integer, A is an arbitrary $n \times n$ matrix, and Q is a symmetric positive definite matrix, is considered. A fixed-point iteration with stepsize parameter for obtaining the symmetric positive definite solution of the matrix equation is proposed. The explicit expressions of the normwise, mixed and componentwise condition numbers are derived. Several numerical examples are presented to show the efficiency of the proposed iterative method with proper stepsize parameter and the sharpness of the three kinds of condition numbers.

Key words. Matrix equation, Symmetric positive definite, Fixed-point iteration, Condition number, Mixed and componentwise.

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