TEMPLE UNIVERSITY
Department of Mathematics

Applied Mathematics and Scientific Computing Seminar

Room 617 Wachman Hall

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A Simplified Newton's Method for a Rational Matrix Problem

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Abstract.

Motivated by the classical Newton-Schulz method for finding the inverse of a non-singular matrix, we develop a new inversion-free method for obtaining the minimal Hermitian positive semidefinite solution X_- of the matrix rational equation $X + A^*X^{-1}A = I$, where I is the identity matrix and A is a given matrix. This equation appears in many applied areas including control theory, dynamical programming, ladder networks, stochastic filtering and statistics.

We present convergence results and discuss stability properties when the method starts from the available matrix AA^*. We also present numerical results to compare our proposal with some recently developed inversion-free techniques for solving the same rational matrix equation.