Electronic Transactions on Numerical Analysis.
Volume 1, pp. 33-48, September 1993.

ISSN 1068-9613.

ETNA
Kent State University
etna@mcs.kent.edu

A MULTISHIFT ALGORITHM FOR THE NUMERICAL SOLUTION OF ALGEBRAIC RICCATI EQUATIONS *

GREGORY AMMAR†, PETER BENNER‡, AND VOLKER MEHRMANN§

Abstract. We study an algorithm for the numerical solution of algebraic matrix Riccati equations that arise in linear optimal control problems. The algorithm can be considered to be a multishift technique, which uses only orthogonal symplectic similarity transformations to compute a Lagrangian invariant subspace of the associated Hamiltonian matrix. We describe the details of this method and compare it with other numerical methods for the solution of the algebraic Riccati equation.

Key words. algebraic matrix Riccati equation, Hamiltonian matrix, Lagrangian invariant subspace.

AMS subject classifications. 65F15, 15A24, 93B40.

*Received July 9, 1993. Accepted for publication August 10, 1993. Communicated by L. Reichel.

† Department of Mathematical Sciences, Northern Illinois University, DeKalb, IL 60115, USA. Email: ammar@math.niu.edu

‡ Institut für Geometrie und Praktische Mathematik, RWTH Aachen, Templergraben 55, D-52056 Aachen, FRG. Present address: Department of Mathematics, 405 Snow Hall, University of Kansas, Lawrence, KS, USA. Email: benner@mercury.math.ukans.edu

§ Fachbereich Mathematik, Technische Universität Chemnitz-Zwickau, Reichenhainerstr. 41, D–O–09009 Chemnitz, FRG. Email: mehrmann@mathematik.tu-chemnitz.de