Chu, King-wah Eric

Singular value and generalized singular value decompositions and the solution of linear matrix equations. (English) Zbl 0612.15003

Linear Algebra Appl. 88-89, 83-98 (1987).

All matrices are taken to be real, but not necessarily square. The author employs the singular value decomposition and a generalization of it to study the solvability of the equation $AXB + CYD = E$, and of the pair of equations $AXB = E$, $FXG = H$. A couple of special cases are considered, and numerical algorithms for the solutions are suggested.

Reviewer: G.P.Barker

MSC:

15A18 Eigenvalues, singular values, and eigenvectors
15A24 Matrix equations and identities
15A09 Theory of matrix inversion and generalized inverses

Keywords:

linear matrix equations; generalized inverses; singular value decomposition; solvability

Full Text: DOI

References:

[1] Baksalary, J.K.; Kala, R., The matrix equation \textit{AX}−YB=C, Linear algebra appl., 25, 41-43, (1979) · Zbl 0403.15010

[2] Baksalary, J.K.; Kala, R., The matrix equation \textit{AXB}−CYD=E, Linear algebra appl., 30, 141-147, (1980) · Zbl 0437.15005

[3] Chu, K.-W.E., The solution of the matrix equations \textit{AXB}+CXD=E and (YA−DZ, YC−BZ)=(E, F), () · Zbl 0631.15006

[4] Golub, G.H.; Van Loan, C.F., Matrix computations, (1983), Johns Hopkins U.P Baltimore · Zbl 0559.65011

[5] Kolka, G.K.G., Linear matrix equations and pole assignment, () · Zbl 0592.93023

[6] Mitra, S.K., Common solutions to a pair of linear matrix equations \textit{A}1XB1=C1 and A2XB2=C2, (), 213-216

[7] Nashed, M.Z., Generalized inverses and applications, (1976), Academic New York · Zbl 0346.15001

[8] Paige, C.C.; Saunders, M.A., Towards a generalized singular value decomposition, SIAM J. numer. anal., 18, 398-405, (1981) · Zbl 0471.65018

[9] Roth, W.E., The equations \textit{AX}−YB=C and AX−XB=C in matrices, Proc. amer. math. soc., 3, 392-396, (1952) · Zbl 0047.01901

[10] Stewart, G.W., Computing the \textit{CS}-decomposition of a partitioned orthogonal matrix, Numer. math., 40, 297-306, (1982) · Zbl 0516.65016

[11] Zietak, K., The \textit{l_{p}}-solution of the linear matrix equation AX+YB=C, Computing, 32, 153-162, (1984) · Zbl 0518.41022

[12] Zietal, K., The Chebyshev solution of the linear matrix equation \textit{AX}+YB=C, Numer. math., 46, 455-478, (1985) · Zbl 0557.65024