ON SPLITTINGS OF MATRICES AND
NONNEGATIVE GENERALIZED INVERSES

DEBASISHA MISHRA AND K.C. SIVAKUMAR

Abstract. The authors introduce a new type of matrix splitting generalizing the notion of *B*-splitting and study its relationships with nonnegativity of the Moore-Penrose inverse and the group inverse.

REFERENCES

[1] ADI BEN-ISRAEL, THOMAS N. E. GREVILLE, *Generalized inverses. Theory and applications*, Springer-Verlag, New York, 2003.

[2] ABRAHAM BERMAN, MICHAEL NEUMANN, *Proper splittings of rectangular matrices*, SIAM J. Appl. Math. **31**, 2 (1976), 307–312.

[3] ABRAHAM BERMAN, ROBERT J. PLEMMONS, *Cones and iterative methods for best square least squares solutions of linear systems*, SIAM J. Numer. Anal. **11** (1974), 145–154.

[4] ABRAHAM BERMAN, ROBERT J. PLEMMONS, *Monotonicity and the generalized inverse*, SIAM J. Appl. Math. **22** (1972), 155–161.

[5] ABRAHAM BERMAN, ROBERT J. PLEMMONS, *Nonnegative matrices in the mathematical sciences*, SIAM, 1994.

[6] JOAN-JOSEP CLIMENT, CARMEN PEREA, *Iterative methods for least-square problems based on proper splittings*, J. Comput. Appl. Math. **158** (2003), 43–48.

[7] LOTHAR COLLATZ, *Functional Analysis and Numerical Mathematics*, Academic, New York, 1966.

[8] T. N. E. GREVILLE, *Note on the Generalized Inverse of a Matrix Product*, SIAM Review **8** (1966), 518–521.

[9] M. A. KRASNOSEL'SKIJ, JE. A. LIFSHITS, A. V. SOBOLEV, *Positive Linear Systems*, Heldermann Verlag, Berlin, 1989.

[10] T. KURMAYYA, K. C. SIVAKUMAR, *Positive splittings of matrices and their nonnegative Moore-Penrose inverses*, Discuss. Math. Gen. Algebra Appl. **28** (2008), 227–235.

[11] O. L. MANGASARIAN, *Characterization of real matrices of monotone kind*, SIAM Review **10** (1968), 439–441.

[12] CARL D. MEYER, JR., R. J. PLEMMONS, *Convergent powers of a matrix with applications to iterative methods for singular linear systems*, SIAM J. Numerical Analysis **14** (1977), 699–705.

[13] DEBASISHA MISHRA, K. C. SIVAKUMAR, *On Splittings of matrices and Nonnegative Generalized Inverses*, Internal Technical Report, Department of Mathematics, IIT Madras, June 2010.

[14] JAMES M. ORTEGA, WERNER C. RHEINBOLDT, *Monotone Iterations for Nonlinear Equations with Application to Gauss-Seidel Methods*, SIAM J. Numerical Analysis **4** (1967), 171–190.

[15] JOSEP E. PERIS, *A new characterization of inverse-positive matrices*, Linear Algebra Appl. **154/156** (1991), 45–58.

[16] ROBERT J. PLEMMONS, *Monotonicity and iterative approximations involving rectangular matrices*, Math. Comp. **26** (1972), 853–858.

[17] JOHANN SCHRÖDER, *Operator Inequalities*, Academic Press, New York, 1980.

[18] RICHARD S. VARGA, *Matrix Iterative Analysis*, Springer-Verlag, Berlin, 2000.

[19] MARTIN WEBER, *On the positiveness of the inverse operator*, Math. Nachr. **163** (1993), 145–149, Erratum. Math. Nachr. **171** (1995), 325–326.

[20] MARTIN WEBER, *On positive invertibility of operators and their decompositions*, Math. Nachr. **282** (2009), 1478–1487.

[21] YIMIN WEI, XIEZHANG LI, HEBING WU, *On the perturbation and subproper splittings for the generalized inverse $A_{T,S}^{(2)}$ of rectangular matrix A*, J. Comput. Appl. Math. **137** (2001), 317–329.

[22] YIMIN WEI, XIEZHANG LI, HEBING WU, *Subproper and regular splittings for restricted rectangular linear system*, Appl. Math. Comput. **136** (2003), 535–547.