

Numerical methods adapted to some classes of matrices related to positivity

Juan M. Peña

University of Zaragoza, Spain

Abstract

Some recent advances on numerical methods adapted to some classes of matrices closely related to positivity are presented. These classes of matrices include sign regular matrices and its subclass of totally nonnegative matrices (matrices whose minors are nonnegative), some classes of P-matrices (matrices whose principal minors are positive), and conditionally positive definite (and conditionally negative definite) matrices.

Some new applications where the numerical results play an important role are provided. We shall focus mainly on applications to Linear Programming, Approximation Theory and Computer Aided Geometric Design, although applications to Economy and Chemistry will also be mentioned.

Keywords

Growth factor, Conditioning, Positive matrices, M-matrices, Totally positive matrices, Sign regular matrices.

References

- Alonso, P., Delgado, J., Gallego, R., and J.M. Peña. Iterative Refinement for Neville Elimination. To appear in *Int. J. Comp. Math.*
- Cortés, V. and J.M. Peña (2008). Decompositions of strictly sign regular matrices. *Linear Algebra Appl.* 429, 1071–1081.
- Cortés, V. and J.M. Peña (2008). A stable test for strict sign regularity. *Math. Comp.* 77, 2155–2171.
- Delgado, J. and J.M. Peña. Computation of the eigenvalues of convexity preserving matrices. To appear in *Applied Mathematics Letters*.
- García-Esnaola, M. and J.M. Peña. Sign consistent linear programming problems. To appear in *Optimization*.
- Koev, P. (2007). Accurate computations with totally nonnegative matrices. *SIAM J. Matrix Anal. Appl.* 29, 435–447.
- Marco, A. and J.J. Martínez (2007). A fast and accurate algorithm for solving Bernstein-Vandermonde linear systems. *Linear Algebra Appl.* 422, 616–628.
- Peña, J.M. (2008). Hierarchical open Leontief models. *Linear Algebra Appl.* 428, 2549–2559.
- Peña, J.M. Positive symmetric matrices with exactly one positive eigenvalue. To appear in *Linear Algebra Appl.*