

The Eigenvalue Complementarity Problem

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ABSTRACT

The Eigenvalue Complementarity Problem (EiCP) is discussed, which arises on a directional instability problem in systems with frictional contact [1]. A few nonlinear programming formulations are introduced for the symmetric EiCP, that is, when the matrices of the problem are both symmetric, such that stationary points of the corresponding objective functions on appropriate convex sets lead to solutions of the problem. In the unsymmetric case, it is shown that the EiCP reduces to a Finite-Dimensional Variational Inequality and to a Mathematical Programming Problem with Linear Complementarity Constraints. Necessary and sufficient conditions for the existence of a solution to the EiCP are established. Projected-gradient and enumerative algorithms are discussed for finding a solution to the symmetric and unsymmetric EiCPs respectively. Computational experience is reported to illustrate the efficiency of the algorithms to deal with these two cases.

References

[1] António Pinto da Costa, João Martins, Isabel Figueiredo and Joaquim Júdice, *The directional instability problems in systems with frictional contacts*, Computer Methods in Applied Mechanics and Engineering 193 (2004) 357-384.