An Alternating Direction Method of Multipliers for the Eigenvalue Complementarity Problem

Joaquim Júdice[1]

[1] Instituto Telecomunicações, Coimbra, Portugal

The Eigenvalue Complementarity Problem (EiCP) has received great interest during the past several years. Many applications, extensions, theoretical results and algorithms have been presented in the literature. In this talk, we introduce an Alternating Direction Method of Multipliers (ADMM) for finding a solution of the nonsymmetric EiCP. A simpler version of this method is also proposed for the symmetric EiCP, that is, for the computation of a Stationary Point (SP) of a Standard Fractional Quadratic Program (SFQP). The algorithm can also be extended for the computation of an SP of a Standard Quadratic Program (SQP). Convergence analyses of these three versions of ADMM are presented. The main computational effort of ADMM is the solution of a Strictly Convex SQP (SCSQP). A Block Principal Pivoting (BPP) is recommended for solving this program and shows to be quite efficient for its goal. Furthermore, the BPP algorithm provides a Stopping Criterion for ADMM that improves very much its efficacy to compute an accurate solution of EiCP. Numerical results of the solution of test problems from different sources indicate that ADMM is in general very efficient for the solution of the symmetric EiCP in terms of the number of iterations and computational effort. ADMM seems to be less efficient for the solution of the nonsymmetric EiCP. However, by relaxing the stopping criterion mentioned above, the algorithm is able to provide a good initial point for a fast second-order method, such as the so-called Semi-smooth Newton (SN) method. The resulting hybrid ADMM and SN algorithm seems to be quite efficient for the solution of the nonsymmetric EiCP in practice.

This is a joint work with Masao Fukushima, Alfredo Iusem & Valentina Sessa.