An SQP method for semidefinite programming

Florian Jarre, Christoph Vogelbusch
University of Düsseldorf, Germany

Roland W. Freund
University of California, Davis, USA

We present a simple sensitivity result for solutions of linear semidefinite programs under small arbitrary perturbations of the data. The result is generalized to nonlinear programs with nonlinear semidefiniteness constraints.

In order to solve such nonlinear semidefinite programs (NLSDPs) a sequence of quadratic semidefinite programs approximating the NLSDP is considered, generalizing the SQP-approach for nonlinear programs.If the quadratic semidefinite subproblems are convex, they can be rewritten as linear conic programs. The sensitivity results are used to derive an elementary and self-contained proof of local quadratic convergence of the resulting sequential linear conic programming (SLCP) method.

A key advantage of the SLCP method lies in the fact that the choice of the symmetrization procedure can be shifted in a very natural way to the linear semidefinite subproblems, and thus being separated from the process of linearizing and convexifying the data of the NLSDP. Globalization techniques and small scale numerical results will be discussed.