EXTREMAL ELLIPSOIDS FOR MODELING THE LOCAL MINIMIZERS OF THE TRUST-REGION SUBPROBLEM *

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Abstract We use the concept of extremal ellipsoids to locate the local minimizers of the trust region subproblem (TRS). This problem consists in minimizing a quadratic function subject to a ball constraint. These local minimizers are useful, in particular, when computing a step in trust region methods for unconstrained minimization and in sequential quadratic programming for constrained optimization. We illustrate in this poster that local minimizers lie in the intersection of the ball constraint and ellipsoids which are locally contained in the ball at the minimizers. Our main modeling tool is a large semidefinite program (SDP) which is different however from the standard semidefinite relaxation naturally associated with the TRS. We implicitly solve this SDP through a sequence of parametric eigenvalue problems to obtain a global minimizer of a large scale TRS. A similar sequence of parametric eigenvalue problems is solved to obtain a local-nonglobal minimizer.

*Research supported by a doctoral scholarship (B2) from the Fonds de recherche sur la nature et les technologies du Québec.

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