A review of "Robust optimization of active trusses via mixed-integer semidefinite programming" by Kai Habermehl. Verlag Dr. Hut, Munich, Germany, 2014.

This is a PhD thesis manuscript reporting on research funded by a German Science Foundation (DFG) project, under the supervision of Prof. Stefan Ulbrich at the Technical University of Darmstadt, Germany. It reports on state-of-the-art non-linear non-convex optimization algorithms for mechanical structure optimization. More specifically, the PhD thesis focused on robust truss topology optimization, which consists of designing load-carrying systems with the least weight and smallest possible amount of material, while ensuring safety and stability despite uncertainty in the loading or material properties.

Following seminal work by Ben-Tal and Nemirovski, reported e.g. in their popular lecture notes [A. Ben-Tal, A. Nemirovski. Lectures on moden convex optimization. MPS-SIAM Series on Optimization, SIAM, Philadelphia, 2001], the robust truss topology problem is formulated as a non-convex semidefinite programming (SDP) problem involving non-linearities and integer variables, as explained in Chapter 3.

Whereas the PENNON optimization algorithm [M. Kočvara, M. Stingl. PENNON: Software for Linear and Nonlinear Matrix Inequalities. pp. 755-794 in: M. F. Anjos, J. B. Lasserre (editors). Handbook on Semidefinite, Conic and Polynomial Optimization. Springer, Berlin, 2012] could be in principle applied to solve (locally) simplified instances, it seems that at the highest level of generality, there is no general-purpose efficient software for addressing satisfactorily these difficult optimization problems. This motivated the development and use of the dedicated optimization algorithms described in Chapter 4. Unfortunately, this resulted in unpublished software and hence non-reproducible numerical results reported in Chapter 5.

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