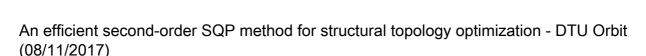
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An efficient second-order SQP method for structural topology optimization

This article presents a Sequential Quadratic Programming (SQP) solver for structural topology optimization problems named TopSQP. The implementation is based on the general SQP method proposed in Morales et al. J Numer Anal 32(2):553–579 (2010) called SQP+. The topology optimization problem is modelled using a density approach and thus, is classified as a nonconvex problem. More specifically, the SQP method is designed for the classical minimum compliance problem with a constraint on the volume of the structure. The sub-problems are defined using second-order information. They are reformulated using the specific mathematical properties of the problem to significantly improve the efficiency of the solver. The performance of the TopSQP solver is compared to the special-purpose structural optimization method, the Globally Convergent Method of Moving Asymptotes (GCMMA) and the two general nonlinear solvers IPOPT and SNOPT. Numerical experiments on a large set of benchmark problems show good performance of TopSQP in terms of number of function evaluations. In addition, the use of second-order information helps to decrease the objective function value.

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