

An efficient second-order SQP method for structural topology optimization - DTU Orbit (08/11/2017)

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.

General information

State: Published

Organisations: Department of Wind Energy, Wind Turbine Structures and Component Design

Authors: Rojas Labanda, S. (Intern), Stolpe, M. (Intern)

Pages: 1315-1333

Publication date: 2016

Main Research Area: Technical/natural sciences

Publication information

Journal: Structural and Multidisciplinary Optimization

Volume: 53

Issue number: 6

ISSN (Print): 1615-147x

Ratings:

BFI (2017): BFI-level 2

Web of Science (2017): Indexed yes

BFI (2016): BFI-level 2

Scopus rating (2016): CiteScore 3.14

Web of Science (2016): Indexed yes

BFI (2015): BFI-level 2

Scopus rating (2015): CiteScore 2.42

Web of Science (2015): Indexed yes

BFI (2014): BFI-level 2

Scopus rating (2014): CiteScore 2.77

Web of Science (2014): Indexed yes

BFI (2013): BFI-level 2

Scopus rating (2013): CiteScore 2.86

ISI indexed (2013): ISI indexed yes

Web of Science (2013): Indexed yes

BFI (2012): BFI-level 2

Scopus rating (2012): CiteScore 2.08

ISI indexed (2012): ISI indexed yes

Web of Science (2012): Indexed yes

BFI (2011): BFI-level 2

Scopus rating (2011): CiteScore 1.85

ISI indexed (2011): ISI indexed yes

Web of Science (2011): Indexed yes

BFI (2010): BFI-level 2

Web of Science (2010): Indexed yes

BFI (2009): BFI-level 2

Web of Science (2009): Indexed yes

BFI (2008): BFI-level 1

Web of Science (2008): Indexed yes

Web of Science (2007): Indexed yes

Web of Science (2006): Indexed yes

Web of Science (2005): Indexed yes

Web of Science (2004): Indexed yes

Web of Science (2003): Indexed yes

Web of Science (2002): Indexed yes

Web of Science (2001): Indexed yes

Web of Science (2000): Indexed yes

Original language: English

Hessian approximation, Minimum compliance, Second-order method, Sequential Quadratic Programming, Topology optimization

DOIs:

10.1007/s00158-015-1381-2

Bibliographical note

This research is funded by the Villum Foundation through the research project Topology Optimization – the Next Generation (NextTop).

Relations

Activities:

11th World Congress of Structural and Multidisciplinary Optimization

DCAMM 15th Internal Symposium

Linear Algebra and Optimization Seminar 2014

Source: FindIt

Source-ID: 2302826176

Publication: Research - peer-review › Journal article – Annual report year: 2016