On the implementation and effectiveness of morphological close-open and open-close filters for topology optimization - DTU Orbit (13/12/2018)

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This note reconsiders the morphological close-open and open-close filters for topology optimization introduced in an earlier paper (Sigmund Struct Multidiscip Optim 33(4–5):401–424 (2007)). Close-open and open-close filters are defined as the sequential application of four dilation or erosion filters. In the original paper, these filters were proposed in order to provide length scale control in both the solid and the void phase. However, it was concluded that the filters were not useful in practice due to the computational cost of the sensitivity analysis. In this note, it is shown that the computational cost is much lower if the sensitivity analysis for each erosion or dilation step is performed sequentially. Unfortunately, it is also found that the close-open and open-close filters do not have the expected effect in terms of length scale control: each close or open operation ruins the effect of the preceding filters, resulting in a design with a minimum length scale in either the solid phase or the void phase, but not both.

General information
State: Published
Organisations: Department of Mechanical Engineering, Solid Mechanics, KU Leuven
Contributors: Schevenels, M., Sigmund, O.
Pages: 15–21
Publication date: 2016
Peer-reviewed: Yes

Publication information
Journal: Structural and Multidisciplinary Optimization
Volume: 54
Issue number: 1
ISSN (Print): 1615-147X
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 3.26
Web of Science (2017): Impact factor 2.876
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.14
Web of Science (2016): Impact factor 2.377
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 2.42
Web of Science (2015): Impact factor 2.208
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 2.77
Web of Science (2014): Impact factor 1.974
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 2.86
Web of Science (2013): Impact factor 1.696
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 2.08
Web of Science (2012): Impact factor 1.728
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): CiteScore 1.85
Web of Science (2011): Impact factor 1.488
ISI indexed (2011): yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Web of Science (2010): Impact factor 1.528
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
Keywords: Topology optimization, Morphological filters, Length scale control, Sensitivity analysis
Electronic versions:
Postprint.pdf. Embargo ended: 11/01/2017
DOIs:
10.1007/s00158-015-1393-y
Source: FindIt
Source-ID: 2290278295
Research output: Research - peer-review Journal article – Annual report year: 2016