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Explicit control of structural complexity in topology optimization

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Abstract

In topology optimization design, specific requirements over the complexity of component geometry often need to be satisfied for practical purposes. In this paper, with the introduction of a novel complexity control measure built on the structural skeletons of solid and void regions, an explicit structural complexity control approach for the topology optimization of continuum structures is proposed under the framework of level-set representation. The use of skeletons enables us to control the minimum sizes of structural holes so as to meet the manufacturing demands. Through numerical comparison with the cases that have been investigated implicitly, we show that the proposed approach is an effective tool to control the structural complexity in an explicit way.

Keywords: Topology optimization; Level set; Structural complexity; Length scale control; Structural skeleton.

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