

Topology Optimization Method for Dynamic Fatigue Constraints Problem

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ABSTRACT

In this research, a new topology optimization (TO) method was proposed to consider dynamic failure criteria (fatigue) under constant and proportional loading. Despite the great development of the topology optimization, the TO method considering the static or dynamic failure constraints has been regarded as one of the difficult problems. Although the TO method for the static failure has been studied extensively nowadays, the TO method considering the dynamic fatigue constraints is remained as an unexplored field. In order to address the dynamic failure in TO, this research develops a new fatigue-constrained topology optimization procedure. Because the dynamic responses as well as the static responses should be considered, it is more difficult than the stress-based topology optimization due to the non-differentiable fatigue criteria of the modified Goodman, the Soderberg and the Gerber theories. By addressing these issues numerically, this research can solve the topology optimization problem considering the fatigue constraint successfully.

Key words: topology optimization; dynamic fatigue constraints;

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