EngOpt2018 - 6th International Conference on Engineering Optimization
Instituto Superior Técnico, Lisbon Portugal • 17-19 September, 2018
Editors: H.C. Rodrigues, J. Herskovits, C.M. Mota Soares, et al.

Abstract ID 1124

TOPOLOGY OPTIMIZATION USING THE HYBRID FINITE ELEMENT-WAVE BASED METHOD FOR STRUCTURAL-ACOUSTIC PROBLEMS

Seongyeol Goo, Semyung Wang

Gwangju Institute of Science and Technology, South Korea
ksy1124@gist.ac.kr, smwang@gist.ac.kr

Keywords: wave-based method,finite element method,mixed-formulation,structural-acoustic problems

Abstract: In this work, we present an efficient topology optimization method for structural-acoustic problems. A mixed-formulation that interpolate the pressure and displacement field simultaneously is the effective way for topology optimization of structural-acoustic problems. In this method, a linear shape function is used for the pressure interpolation to represent continuous pressure field while quadratic shape function is used for displacement interpolation to ensure numerical stability. This leads to a heavy computational cost in high frequency range or large-scale problem which require a fine discretization. In this regard, we present an efficient topology optimization using the hybrid finite element-wave based method. The wave-based method which uses an exact solutions for field variable approximation is an efficient and accurate numerical prediction method. In the non-design domain, the wave-based method is applied to reduce computational cost. In the design domain, finite element method with mixed-formulation is used to design parameterization. We use the gradient-based optimizer and design sensitivities are computed by the adjoint variable method. Numerical examples are presented to validate the propose method. Result of optimization confirms that the proposed method is able to reduce computational cost compared to conventional method. Acknowledgement This work was supported by a National Research Foundation of Korea (NRF) grant funded by the Korean government (NRF-2017R1A2A1A05001326).