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# TOPOLOGY OPTIMIZATION FOR DYNAMIC SCALING APPLICATION USING A GRADIENT-BASED OPTIMIZATION APPROACH

**Éder Oliveira[(1)], Frederico Afonso[(1)], Abdolrasoul Sohouli[(1)], ROBERTO Gil Annes SILVA[(2)], Afzal Suleman[(3)]**

[(1)]Instituto Superior Técnico, Portugal
*eder.oliveira@tecnico.ulisboa.pt, frederico.afonso@tecnico.ulisboa.pt, rasoul.sohouli@gmail.com*

[(2)]Instituto Tecnológico de Aeronáutica, Brazil
*gil@ita.br*

[(3)]IDMEC and University of Victoria, Portugal
suleman@tecnico.ulisboa.pt

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**Abstract:** A methodology was developed to prepare a dynamically scaled model of a lifting surface based on 3D printing potentialities. The dynamic scaling approach is a process to achieve a scaled model (scaled down, e.g., 1/10) able to reproduce the same equivalent dynamic behavior of the full scale model. The objective function was to find the same scaled eigenvalues and eigenvectors as the full scale. The design variables are the material density in the design domain. The matching of the modal parameters between the full scale model and the scaled model was achieved through topology optimization based on a gradient-based optimization. The optimization process is written in Matlab® and the finite element model was solved in Abaqus®. The developed optimization framework was tested with some case studies. The approach can be used to design a scaled model with different material compared to the full scale model.