

# **Structural Dynamic Response Topology Optimization with Anisotropic Material Based on ICM Method**

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**Abstract:** This paper aims at finding optimized topology of continuum structures with anisotropic material under harmonic excitations by using Independent, Continuous, Mapping (ICM) Method. The present work develops the concept and connection of independent continuous topological variables and filter functions. We introduced the filter functions of elemental mass matrix, elemental stiffness matrix and elemental weight and the filter function of the interpolation equations of anisotropic stiffness matrix was deduced. Then these filter function were putted into the dynamic topology optimization of differential equation to analyses the design sensitivity and optimize the structure. An explicit expression of dynamic response amplitude with respect to the topological variables is obtained based on sequential approximation, and first-order Taylor expansion. The mathematical formulation of optimal problem of continuum structure is established, which is referring to weight as objective and subject to response amplitude. Finally, the topology optimization problem is solved by dual sequence quadratic programming (DSQP). Numerical examples are provided to demonstrate the validity and effectiveness of the ICM method.

**Keywords:** Topology optimization, Dynamic response, Anisotropic materials, ICM method