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TOPOLOGY OPTIMIZATION FOR MICROSTRUCTURE OF HYPERELASTIC COMPOSITES

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The present study proposes topology optimization for microstructure of composites to maximize the energy absorption capacity. In general, the mechanical behavior of composite materials mainly depends on the geometric properties of the micro-structure such as material distribution, shape or size of constituents. In other words, designing microstructure is an effectual way to improve the macro-scopic performance. For linear elastic problems, a previous study [1] introduces the basic concept of the present approach and shows sucessful results for maximizing the stiffness of macrostructure. The present study tries to extend it to nonlinear structural problems considering hyperelastic behavior. As the preliminary investigation for it, we develop topology optimization of microstructure with periodic boundary conditions for hyperelastic behavior independently of the macro boundary value problem (BVP). It was verified from numerical examples that the proposed method provides effective material designs for microstructure.

REFERENCES

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