Liang, Kewei; Lu, Xiliang; Yang, Jerry Zhijian


Summary: In this paper, an extremal eigenvalue problem corresponding to an inhomogeneous membrane which is composed of two different materials with different densities is investigated. The convergence of the finite element discretization and the error order for the smallest eigenvalue are obtained. A monotonic decreasing algorithm is presented to solve the discretized problem and numerical examples are given to demonstrate the error estimation as well as the efficiency of the method.

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