

Acoustic Eigenvalue Analysis Using Fast BEM and A Contour Integral Method

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In this paper, a contour integral method called the block Sakurai-Sugiura (SS) method is implemented to solve eigenvalue problems governed by the Helmholtz equation and formulated through the boundary element method. The nonlinear eigenvalue problem is converted into a standard linear eigenvalue problem, and eigenvalues whose multiplicity is larger than one can also be extracted by using the block version of the SS method. In order to solve the boundary element linear equations with multiple right-hand sides efficiently, the block IDR(s) solver and the fast multipole method are employed in this study to improve the overall computational efficiency. Numerical examples are given to demonstrate the accuracy and effectiveness of the present method.

Keywords: Eigenvalue analysis, Boundary element method, Contour integral, Fast multipole method, Block IDR(s)