**Liu, Lei**; **Zhang, Junqi**; **Song, Chongmin**; **Birk, Carolin**; **Saputra, Albert A.**; **Gao, Wei**
**Automatic three-dimensional acoustic-structure interaction analysis using the scaled boundary finite element method.** (English) Zbl 1452.65350
J. Comput. Phys. 395, 432-460 (2019).

Summary: An automatic approach for 3D analysis of acoustic-structure interaction problems is proposed based on the scaled boundary finite element method (SBFEM). The acoustic domain studied in this paper is assumed to be infinite. The infinite acoustic domain is divided into a near field (bounded domain) and a far field (unbounded domain). The acoustic near field contains structures of arbitrary shape, while the far field represents the unbounded acoustic domain. For modeling the wave propagation accurately and efficiently, continued fractions are employed to evaluate the dynamic stiffness and impedance of subdomains in both structural and acoustic domains. The time-domain equations for both structural and acoustic domains can be obtained by introducing auxiliary variables. Via satisfying the boundary conditions on the acoustic-structure interface, the global system of equations for acoustic-structure interaction system can be constructed. Symmetric formulations can also be obtained for this coupled system. Since the SBFEM requires the discretization of only the boundary, the mesh transition on the acoustic-structure interface is easily addressed by the subdivisions of 2D surface elements. Automatic meshing techniques can be incorporated in the proposed approach to generate meshes directly from the input geometrical models. Numerical examples are presented to demonstrate the accuracy, efficiency and potential of the proposed approach for modeling complex 3D acoustic-structure interaction problems.

**MSC:**

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|---|---|---|
| 65N30 | Finite element, Rayleigh-Ritz and Galerkin methods for boundary value problems involving PDEs | Cited in **1** Document |
| 65Z05 | Applications to the sciences | |
| 74B05 | Classical linear elasticity | |
| 74S05 | Finite element methods applied to problems in solid mechanics | |

**Keywords:**

3D acoustic-structure interaction; scaled boundary finite element method; continued fraction; octree mesh; STL file

**Full Text:** DOI

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