ABSTRACT

Modeling sound propagation in complex environments can be a difficult task. In realistic applications, the boundaries of scatterers present in the propagation domain can be partially absorbing, and this must be accounted for in the numerical models. This paper addresses the use of a frequency-domain Dual-BEM (BEM/TBEM) formulation to model the propagation of sound generated by fixed and moving point loads in 2.5D configurations, in the presence of very thin elements with partially absorbing surfaces. The proposed approach is based on the concept of impedance boundary conditions and is applied in conjunction with a Dual-BEM approach, thereby allowing the definition of models in which only very compact descriptions of the propagation domain are required. Since a 2.5D formulation is used, 3D responses can be computed as a discrete summation of simpler 2D solutions. The formulation of the numerical methods used here (BEM, TBEM and Dual-BEM) are described, together with the strategy devised by the authors to incorporate sound absorption. A numerical application involving fixed and moving 3D sources is described to illustrate the applicability and usefulness of the proposed approaches.

Key words: Acoustic Wave Propagation, Sound Absorption, Thin Elements / Heterogeneities, Dual BEM/TBEM Formulation, Moving Sources, 3D Sources.