Application of complete radiation boundary conditions for the Helmholtz equation in perturbed waveguides

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ABSTRACT

In this paper, we study the application of the complete radiation boundary conditions (CRBCs) to waveguides of general shape. The CRBCs were proposed for high-order absorbing boundary conditions for wave propagation problems [1]. The well-posedness and convergence analysis for the Helmholtz equation in lateral waveguides supplemented with the CRBCs has been investigated in [2]. We extend the application of the CRBCs to general waveguides consisting of components of waveguides locally perturbed from infinite or semi-infinite lateral waveguides, such as waveguide bends, waveguides with a heterogeneous inclusion and coupled waveguides. We also improve the performance of CRBCs in two aspects: two-sided optimal selection of parameters and different terminal condition of auxiliary functions for better treatment of cutoff modes. The finite element numerical experiments confirming the convergence theory will be presented.

REFERENCES
