Fourier Galerkin Approach to Wave Equation with Absorbing Boundary Conditions

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Abstract : Numerical computation of wave propagation in a large domain usually requires significant computational effort. Hence, the considered domain must be truncated to a smaller domain of interest. In addition, special boundary conditions, which absorb the outward travelling waves, need to be implemented in order to describe the system domains correctly. In this work, the linear one dimensional wave equation is approximated by utilizing the Fourier Galerkin approach. Furthermore, the artificial boundaries are realized with absorbing boundary conditions. Within this work, a systematic work flow for setting up the wave problem, including the absorbing boundary conditions, is proposed. As a result, a convenient modal system description with an effective absorbing boundary formulation is established. Moreover, the truncated model shows high accuracy compared to the global domain.

Keywords : absorbing boundary conditions, boundary control, Fourier Galerkin approach, modal approach, wave equation
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