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Sinopsis

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Devoted to fully developing and comparing continuous and the discrete approaches to the numerical approximation of controls for wave propagation phenomena
Provides convergence results for the discrete wave equation when discretized using finite differences and proves the convergence of the discrete wave equation with non-homogeneous Dirichlet conditions
??????This book is devoted to fully developing and comparing the two main approaches to the numerical approximation of controls for wave propagation phenomena: the continuous and the discrete. This is accomplished in the abstract functional setting of conservative semigroups.The main results of the work unify, to a large extent, these two approaches, which yield similaralgorithms and convergence rates. The discrete approach, however, gives not only efficient numerical approximations of the continuous controls, but also ensures some partial controllability properties of the finite-dimensional approximated dynamics. Moreover, it has the advantage of leading to iterative approximation processes that converge without a limiting threshold in the number of iterations. Such a threshold, which is hard to compute and estimate in practice, is a drawback of the methods emanating from the continuous approach. To complement this theory, the book provides convergence results for the discrete wave equation when discretized using finite differences and proves the convergence of the discrete wave equation with non-homogeneous Dirichlet conditions. The first book to explore these topics in depth, "On the Numerical Approximations of Controls for Waves" has rich applications to data assimilation problems and will be of interest to researchers who deal with wave approximations.?
Content Level » Research

Keywords » controllability - convergence results - finite differences - numerical approximation - observability - wave equation

Related subjects » Analysis - Applications - Computational Science & Engineering - Dynamical Systems & Differential Equations

Table of contents 1.Numerical approximation of exact controls for waves.- 2.The discrete 1-d wave equation.- 3.Convergence for homogeneous boundary conditions.- 4.Convergence with non-homogeneous data.- 5. Further comments and open problems.- References.