

Parabolic-Hyperbolic Transmission Problem in Disjoint Domains

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Abstract

In applications, especially in engineering, often are encountered composite or layered structures, where the properties of individual layers can vary considerably from the properties of the surrounding material. Layers can be structural, thermal, electromagnetic or optical, etc. Mathematical models of energy and mass transfer in domains with layers lead to so called transmission problems. In this paper we investigate a mixed parabolic-hyperbolic initial-boundary value problem in two non-adjacent rectangles with nonlocal integral conjugation conditions. It was considered more examples of physical and engineering tasks which are reduced to transmission problems of similar type. For the model problem the existence and uniqueness of its weak solution in appropriate Sobolev-like space is proved. A finite difference scheme approximating this problem is proposed and analyzed.

Keywords: transmission problem, disjoint domains, nonlocal integral conjugation conditions, Sobolev spaces, weak solution, a priori estimate, finite differences, convergence rate

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