

Dynamic projection operator method in the theory of hyperbolic systems of partial differential equations with variable coefficients

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Abstrak

ABSTRAK

We consider a generalization of the projection operator method for the case of the Cauchy problem in 1D space for systems of evolution differential equations of first order with variable coefficients. It is supposed that the dependence of coefficients on the only variable is weak, that is described by the introduction of a small parameter. Such problem corresponds, for example, to the case of wave propagation in a weakly inhomogeneous medium. As an example, we specify the problem to adiabatic acoustics in waveguides with a variable cross section. Projection operators are constructed for the Cauchy problem to fix unidirectional modes. The method of successive approximations perturbation theory is developed and based on the pseudodifferential operators theory. The application of projection operators adapted for the case under consideration allows deriving approximate evolution equations corresponding to the separated directed waves.