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ON SOME CLASS OF INITIAL BOUNDARY VALUE PROBLEMS FOR SECOND ORDER QUASILINEAR HYPERBOLIC SYSTEMS

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Summary We consider some class of initial-boundary value problems for second order, quasilinear, hyperbolic systems containing the Neumann and Dirichlet problems. Using Shibata's ideas we prove the existence of an unique local, smooth solution. In the separate paper [4] we show that the presented results can be applied to elasticity and generalized thermoelasticity.

Introduction.

In recent years we can observe an interesting progress in the theory of the existence of local solutions to the initial-boundary value problems for second order, quasilinear, hyperbolic systems. The Cauchy-Dirichlet problem was investigated in the papers [3], [6], [11] and the Cauchy-Neumann problem was solved in [16], [20], [21]. In the paper [10] an abstract, semigroup approach was presented which allows for solving the both types of mentioned problems. Although the semigroup approach is very elegant, it seems that from the point of view of applications the concrete and elementary energy methods used in [20] are more adequate. Furthermore, using the energy methods one can consider the systems with coefficients depending explicitely on t and on the derivatives of the unknown function with respect to t (cf. (1.1), (1.2) below). In the present paper we demonstrate an unified approach to the mixed problems with Neumann and Dirichlet boundary conditions. We assume that some components of the unknown vector-function satisfy the Neumann boundary conditions, while the remaining ones the Dirichlet conditions. Since we do not exclude the situation in which all components satisfy the same type of boundary conditions we obtain generalization of the results presented in [3], [6] and [20]. In a consequence our theory can be applied to such problems of elastodynamics as the traction or presure problem as well as to the problem of place. On the other

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