Boundary value problems for loaded hyperbolic equations

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Abstract: The paper discusses some of the distinctive features, related to the formulation and study of boundary value problems for the loaded hyperbolic equations

$$u_{xx} - u_{yy} = \lambda u(x_0, y) \qquad (1)$$

where λ and x_0 are given real constants. Along with the setting of the Cauchy problem we investigate domain of dependency, influence and definition of solution $u(x, y)$ for equation (1) by the Cauchy datas in the whole space, as well as in its bounded subdomain. The Goursat problem and the Darboux problem in nonlocal setting are formulated and investigated. Some of these results has already been announced in works [1] and [2] in the case of the spectrally loaded equation [3] of the form

$$u_{xx} - u_{yy} = \lambda u_{yy}(x_0, y).$$

Keywords: loaded wave equation, Goursat problem, Darboux problem

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