

The Cauchy problem for a general class of doubly dispersive nonlocal nonlinear wave equations

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We consider the general class of nonlocal nonlinear wave equations $u_{tt} - Lu_{xx} = B(g(u))_{xx}$, extending the class studied in [1]. The nonlocal nature of the problem is reflected by two different elliptic pseudodifferential operators L and B acting on linear and nonlinear functions of the dependent variable, respectively. The well-known doubly dispersive nonlinear wave equation that incorporates two types of dispersive effects originated from two different dispersion operators falls into the category studied here. The class of nonlocal nonlinear wave equations, modeling the bi-directional propagation of dispersive waves in various contexts, also covers a variety of well-known wave equations such as various forms of the Boussinesq equation. Local existence of solutions of the Cauchy problem with initial data in suitable Sobolev spaces is proven and the conditions for global existence and finite-time blow-up of solutions are established [2]. This is a joint work with Ceni Babaoglu and Albert Erkip. This work has been supported by the Scientific and Technological Research Council of Turkey (TUBITAK) under the project TBAG-110R002.

References

- [1] *N. Duruk, H. A. Erbay, A. Erkip*: Global existence and blow-up for a class of nonlocal nonlinear Cauchy problems arising in elasticity. *Nonlinearity* 23 (2010), 107–118.
- [2] *C. Babaoglu, H. A. Erbay, A. Erkip*: Global existence and blow-up of solutions for a general class of doubly dispersive nonlocal nonlinear wave equations. *Nonlinear Anal.* 77 (2013), 82–93.