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Petronela Radu* (pradu@math.unl.edu), 203 Avery Hall, Lincoln, NE 68588, **Grozdena Todorova**, Knoxville, TN , and **Boris Yordanov**, Sofia, Bulgaria. *Diffusion phenomenon and decay rates for nonlocal wave equations with damping.*

Nonlocal wave equations with damping have only recently started to be explored in the context of peridynamics and other theories that allow solutions to be discontinuous. In this talk I will focus on results that connect the asymptotic behavior of solutions to dissipative wave equations to solutions of the corresponding diffusion equations, more precisely, show that the abstract diffusion phenomenon takes place. The results hold true in fact for systems that involve two non-commuting self-adjoint operators in a Hilbert space. When the diffusion semigroup has the Markov property and satisfies a Nash-type inequality, we obtain precise estimates for the consecutive diffusion approximations and remainder. Also, I will present some applications including sharp decay estimates for dissipative hyperbolic equations with variable coefficients on an exterior domain. To our knowledge we have obtained the first decay estimates for nonlocal wave equations with damping terms; the decay rates are sharp. Some of these results have been obtained in collaboration with Grozdena Todorova and Boris Yordanov. (Received September 11, 2015)