1097-35-498 **Irena Lasiecka** (lasiecka@memphis.edu), Department of mathematical Sciences, University of Memphis, Memphis, TN 38152-3370, and **Xiaojun Wang*** (xwang13@memphis.edu), Department of Mathematical Sciences, University of Memphis, Memphis, TN. *Optimal decay rates for the energy in systems arising in nonlinear mechanic with memory effects.* Preliminary report.

We consider viscoelastic nonlinear plate equation with memory kernel quantified by the following differential inequality: $g' + H(g) \leq 0, s \geq 0$ where $ H(s)$ is a given continuous, positive, increasing, and convex function such that $H(0) = 0$. We shall show that the energy of the nonlinear PDE with viscoelasticity is driven by the same inequality. The results presented provide an uniform framework for obtaining optimal decay rates for the energy of nonlinear mechanical systems which contain memory effects. The study of PDE with a memory will be reduced to solving an appropriate nonlinear ODE systems. The method is based on the idea introduced in Lasiecka and Tataru ["Uniform boundary stabilization of semilinear wave equation with nonlinear boundary dissipation," Differential and Integral Equations 6, 507–533 (1993)]. (Received January 28, 2014)