1010-93-112 **Irena Lasiecka** and **Daniel Y Toundykov*** (dyt5h@virginia.edu), P. O. Box 400137, University of Virginia, Charlottesville, VA 22904. *Energy Decay Rates for the Semilinear Wave Equation with Nonlinear Localized Damping and Source Terms - an Intrinsic Approach.*

We develop an intrinsic approach to derivation of energy decay rates for the semilinear wave equation with localized interior nonlinear monotone damping $g(u_t)$ and a nonlinear source term $f(u)$.

The method leads to optimal decay rates for solutions of semilinear hyperbolic equations driven by a source of critical exponent and subjected to nonlinear damping localized in a region adjacent to a portion of the boundary. The features of the model include: (1) Neumann boundary conditions, and (2) the sole requirements on $g(s)$ are monotonicity and continuity, in particular no differentiability or growth restrictions are imposed on the damping both at the origin and at infinity.

Because Neumann boundary does not satisfy Lopatinski condition, the study of energy propagation in the absence of dissipation near the Neumann segment requires special geometric considerations. Asymptotic energy decay rates follow from an intrinsic algorithm driven by solutions of a simple ODE.

An important corollary of our theorem is a stability result stating that under certain conditions, with sublinear damping at infinity, the solution remains forever uniformly bounded in the norms above the finite energy level even in the presence of a nonlinear source. (Received August 22, 2005)