1036-35-121 **Sriyani Renuka Menike Rathugamage*** (rsmenike@oakland.edu), Department of Mathematics and Statistics, Oakland University, Rochester, MI 48309. *Dynamic Adhesive Contact of a Rod.*

We analyze a model for the dynamics of a thin viscoelastic or elastic rod which is in adhesive contact with an obstacle. The model consists of the hyperbolic equation for the vibrations of the rod coupled with a nonlinear ordinary differential equation for the evolution of the bonding function.

The *bonding function* $\beta = \beta(t)$ measures the fractional density of active bonds, and satisfies the constraint $0 \leq \beta \leq 1$. The existence of the unique weak solution for the dynamic model with viscosity is established by using an existence result for ordinary differential equations and the Schauder fixed-point theorem. We also show the existence of weak solutions without viscosity and when the obstacle is completely rigid, so that the contact condition becomes unilateral. In both cases we obtain the necessary a priori estimates and obtain the weak solutions, by passing to the limits when the viscosity approaches zero, or stiffness of the obstacle approaches infinity. (Received January 19, 2008)