1097-35-502 **Irena Lasiecka***, Department of Mathematical Sciences, University of Memphis, Memphis, TN , and **Philip Graber** (philip.graber@inria.fr), INRIA, Paris, France. *Gevrey class regularity for a strongly damped wave equation with hyperbolic dynamic boundary conditions.*

We consider a linear system of PDEs of the form

$$\begin{aligned} u_{tt} - c\Delta u_t - \Delta u = 0 \ in \ \Omega \times (0,T) \\ u_{tt} + \partial_n(u + cu_t) - \Delta_\Gamma(c\alpha u_t + u) = 0 \ on \ \Gamma_1 \times (0,T) \\ u = 0 \ on \ \Gamma_0 \times (0,T) \end{aligned} \tag{1}$$

on a bounded domain Ω with boundary $\Gamma = \Gamma_1 \cup \Gamma_0$. We show that the system generates a strongly continuous semigroup $T(t)$ which is analytic for $\alpha > 0$ and of Gevrey class for $\alpha = 0$. In both cases the flow exhibits a regularizing effect on the data. In particular, we prove quantitative time-smoothing estimates of the form $\|(d/dt)T(t)\| \leq |t|^{-1}$ for $\alpha > 0$, $\|(d/dt)T(t)\| \leq |t|^{-2}$ for $\alpha = 0$. The argument is based on microlocalization in the boundary collar. Moreover, when $\alpha = 0$ we prove a novel result which shows that these estimates hold under relatively bounded perturbations up to $1/2$ power of the generator. (Received January 28, 2014)