Global Wellposedness and Uniform Stability of a Quasilinear Thermo-elastic PDE system

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We consider a nonlinear thermoelastic system defined on a bounded domain $\Omega \subset \mathbb{R}^n, n = 2$ or 3:

$$\begin{cases} w_{tt} - \gamma\Delta w_{tt} + \Delta^2 w + \alpha\Delta((\Delta w)^3) = \Delta\theta \\ \theta_t - \Delta\theta = -\Delta w_t \end{cases} \tag{1}$$

for $\gamma \geq 0$ with the boundary conditions imposed on $\Gamma = \partial\Omega$ corresponding to the simply supported plate. The main goal of this talk is to discuss the wellposedness of suitable solutions to the system defined above.

I will first introduce the background of this model, and then briefly talk about the work on the case $\gamma = 0$. Our main challenge is to consider the case when $\gamma > 0$, of which the first equation (elasticity) is of hyperbolic — rather than of parabolic type. From a mathematical point of view, the most important message is that the *analyticity* and *maximal regularity* of the associated linear system are *gone*. We will show how to choose suitable topologies to overcome this difficulty.

This is a joint work with Irena Lasiecka, University of Memphis.