Irena M Lasiecka* (lasiecka@memphis.edu), Department of Mathematical Sciences, University of Memphis, Memphis, TN. Analysis of a third order in time abstract dynamics arising in the modeling High Frequency Ultrasound (HIFU).

We consider a third order in time abstract dynamics arising in modeling of High Frequency Ultrasound. Of particular interest is MGT (Moore-Gibson-Thompson) equation which model accounts for a finite speed of propagation of acoustic waves. This phenomenon results from the application of Catteneo Law rather than the Fourier’s Law in describing heat conduction. The resulting model is a third order in time equation with a heat relaxation parameter. In addition to the heat flux relaxation, molecular relaxation is also accounted for. The latter results in adding memory term with a dynamic relaxation kernel. Questions related to well-posedness and stability of the resulting third order dynamics with a memory are discussed. Sharp stability results will be presented.

In particular, it will be shown that the dynamics can be uniformly stabilized through molecular relaxation only and without any mechanical dissipation. Quantitative description of stability is provided by optimal decay rates for the energy which reflect the rates of decay of molecular relaxation. These results are obtained in collaboration with Philipo Del’Oro, Vittorino Pata and Xiaojun Wang. (Received July 29, 2017)