1046-92-1717 **Kasey Crompton** (kc_2001_nicole@hotmail.com), Columbia, SC 29208, **Andrew Davis** (davisad@clarkson.edu), Postsdam, NY 13699, **Satoru Ito*** (sito@ncsu.edu), Raleigh, NC 27695, **Amanda Olsen** (amolsen@lagrange.edu), LaGrange, GA 30240, **Gregory Morton** (gregory1morton@gmail.com), Atlanta, GA 30314, **Daniela Valdez** (dvaldez@ncsu.edu), Raleigh, NC 27695, and **Mette Olufsen** (msolufse@ncsu.edu), Raleigh, NC 27695. *Predicting viscoelastic properties of the arterial wall.*

This study utilizes a 2-parameter elastic model and a 4-parameter Kelvin viscoelastic model to predict elastic and viscoelastic properties of the arterial wall using in-vivo measurements of vessel area and blood pressure. Data were measured in the proximal ascending aorta in seven sheep at a number of different frequencies. Mechanical properties were predicted by solving the inverse problem minimizing the least squares error between computed and measured values of vessel area. Results showed that we were able to estimate model parameters using only a portion of the data. While the vessel radius was not significantly impacted by changes in frequency, differences were observed in both elastic and viscoelastic parameters. Results of sensitivity analysis showed that all parameters were sensitive, and since all model parameters are independent, we conclude that it is possible to estimate all parameters. Moreover, results showed that the Kelvin viscoelastic model was able to capture the pressure-area hysteresis, which the elastic model could not predict. Finally, we showed that the hysteresis is significantly smaller in-vivo than in-vitro, a phenomenon, which may be a result of smooth muscle cell regulation and support of adventitia. (Received September 16, 2008)