1106-00-2932 **Nakeya D Williams*** (nakeya.williams@usma.edu), West Point, NY 10996. *Mathematical Modeling of Cardiovascular Dynamics during Head-up Tilt.* Preliminary report.

Pulsatile and non-pulsatile models that predict dynamic changes in arterial blood pressure during head-up tilt (HUT) are presented in this work. This study shows how mathematical modeling can be used to predict changes in cardiac contractility and vascular resistance, quantities that cannot be measured invasively, but which are useful to assess the state of the cardiovascular system. The models are rendered patient specific via the use of parameter estimation techniques. This process involves sensitivity analysis, prediction of a subset of identifiable parameters, and nonlinear optimization. Results show that it is possible to identify a subset of model parameters that can be estimated allowing the models to predict changes in arterial blood pressure observed at the level of the carotid bifurcation. It is also shown that a simpler non-pulsatile model can be used in conjunction with other physiological models; yet still portray the same dynamics as the pulsatile model. We also show that an optimal control approach is useful for controlling quantities that effect the cardiovascular system during HUT in comparison to numerical optimization with piece-wise linear splines. (Received September 17, 2014)