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Nakeya D Williams* (nakeya.williams@usma.edu), West Point, NY 10698. *Modeling Head-up Tilt via an Optimal Control Approach and a Non-pulsatile Cardiovascular Model*. Preliminary report.

This study considers an optimal control approach to modeling effects of cardiovascular regulation during head-up tilt (HUT). Many patients who suffer from dizziness or light-headedness are often exposed to the HUT test to explore potential deficits within the autonomic control system, which maintains the cardiovascular system at homeostasis. This system is complex and difficult to study in-vivo, thus we propose to use mathematical modeling to achieve a better understanding of the cardiovascular regulation system during HUT. In particular, we show the feasibility of using optimal control to predict changes in vascular resistance and cardiac contractility, quantities that cannot be measured directly, but which are useful to assess the state of the cardiovascular system. A non-pulsatile lumped parameter model is utilized as well as a direct transcription optimal control method to regulate the cardiovascular system. (Received September 23, 2015)