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Christina L. Hamlet* (chamlet@tulane.edu), **Kathleen A. Hoffman**, **Eric D. Tytell** and **Lisa J. Fauci**. *A central pattern generator-driven integrative multi-scale model of lamprey locomotion with sensory feedback.*

The lamprey is a vertebrate organism and a model for both neurophysiology and locomotion studies. Here a 2D, integrative, multi-scale model of the lamprey's anguilliform (eel-like) swimming is driven by neural activation from a central pattern generator (CPG) modeled as a chain of coupled oscillators. The CPG in turn drives muscle kinematics and fully coupled fluid-structure interactions implemented in an immersed boundary framework to produce the emergent swimming mode. Body curvature and rate of curvature change provide feedback to the CPG. Effects of nonlinear dependencies associated with muscle force development combined with feedback to the neural activation on the speed, stability and cost (metabolic work) of swimming are estimated and examined. (Received September 22, 2015)