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Is paramecium swimming autonomic? PROMODE R. BANDYOPADHYAY, NORMAN TOPLOSKY, JOSHUA HANSEN, Naval Undersea Warfare Center, Newport, RI 02841, USA — We seek to explore if the swimming of paramecium has an underlying autonomic mechanism. Such robotic elements may be useful in capturing the disturbance field in an environment in real time. Experimental evidence is emerging that motion control neurons of other animals may be present in paramecium as well. The limit cycle determined using analog simulation of the coupled nonlinear oscillators of olivo-cerebellar dynamics (ieee joe **33**, 563-578, 2008) agrees with the tracks of the cilium of a biological paramecium. A 4-motor apparatus has been built that reproduces the kinematics of the cilium motion. The motion of the biological cilium has been analyzed and compared with the results of the finite element modeling of forces on a cilium. The modeling equates applied torque at the base of the cilium with drag, the cilium stiffness being phase dependent. A low friction pendulum apparatus with a multiplicity of electromagnetic actuators is being built for verifying the maps of the attractor basin computed using the olivo-cerebellar dynamics for different initial conditions. Sponsored by ONR 33.

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