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Effect of receptor potential on mechanical oscillations in a model of sensory hair cell MAHVAND KHAMESIAN, ALEXANDER B. NEIMAN, Ohio University — Hair cells mediating the senses of hearing and balance rely on active mechanisms for amplification of mechanical signals. In amphibians, hair cells exhibit spontaneous self-sustained mechanical oscillations of their hair bundles. We study the response of the mechanical oscillations to perturbation of the cell's membrane potential in a model for hair bundle of bullfrog saccular hair cells. We identify bifurcation mechanism leading to mechanical oscillations using the membrane potential and the strength of fast adaptation as control parameters and then compute static and dynamic sensitivity of mechanical oscillations to voltage variations. We show that fast adaptation results in the static sensitivity of oscillating hair bundles in the range 0.1 – 0.2 nm/mV, consistent with recent experimental work. Predicted dynamic response of oscillating hair bundle to voltage variations is characterized by the values of sensitivity of up to 2 nm/mV, enhanced by the presence of fast adaptation.

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