

Abstract Submitted
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Active stochastic oscillations and amplification of mechanical stimuli in a hair cell model LIJUAN HAN, ALEXANDER NEIMAN, Ohio University — We study signal transduction in spontaneously oscillating hair bundles of an auditory hair cell using a computational model. The effects of intrinsic noise from the Brownian motion of hair bundles and from stochastic fluctuations of transduction ion channels as well as periodic fluctuations of the receptor potential are taken into account. The model shows the explosion of a canard trajectory near the Hopf bifurcation. We have found that the system's gain of weak mechanical stimuli can be greatly enhanced when the system operates slightly beyond the Hopf bifurcation, i.e. in the canard region. The gain can also be optimized by tuning the noise intensity.

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