Controlling bistability in a stochastic perception model

A.N. Pisarchik , I. A. Bashkirtseva, L. B. Ryashko

Abstract

Using a simple bistable perception model, we demonstrate how coexisting states can be controlled by periodic modulation applied to a control parameter responsible for the interpretation of ambiguous images. Because of stochastic processes in the brain, any percept is statistically recognized and multistability in perception never occurs. A stable periodic orbit created by the control modulation splits in two limit cycles in an inverse gluing bifurcation, which occurs when the modulation frequency increases. The statistical analysis of transitions between the coexisting states in the presence of noise reveals conditions under which an ambiguous image can be interpreted in a desired way determined by the control.