

High-frequency effects in excitable and bistable systems

David Cubero¹, J.P. Baltanas², and Jesús Casado-Pascual¹

(1) Física Teórica, Universidad de Sevilla, Apartado de Correos 1065, Sevilla 41080, Spain

(2) Departamento de Matemáticas, Universidad de Huelva, Avda. de las Fuerzas Armadas s/n , Huelva 21071, Spain
(dcubero@us.es)

We study the influence of a high-frequency signal on two archetypal non-linear systems: the bistable potential and the FitzHugh-Nagumo (FHN) excitable model. While in the former case the effect is a global amplification of the coherent response of the system to a weak external signal, in the excitable system this response is degraded. More specifically, we show that the excitable character of the FHN system, and consequently the firing activity, is suppressed when the ratio of the high-frequency amplitude to its frequency is above a given threshold value. On the other hand, the positive effect in bistable systems is demonstrated by showing that stochastic resonance gains larger than unity for external subthreshold sinusoidal signals are possible by using suitable high-frequency signals.

[1] D. Cubero, J.P. Baltanas, J. Casado-Pascual, submitted to Phys. Rev. (2006).

[2] J. Casado-Pascual and J.P. Baltanas, Phys. Rev. **E69**, 046108 (2004).