

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Fluctuation spectra in weakly modulated nonlinear systems YAXING ZHANG, Michigan State University, YUKIHIRO TADOKORO, Toyota Central R&D Labs., Inc., MARK DYKMAN, Michigan State University — We consider periodically modulated nonlinear systems and show that, along with the delta-peak at the modulation frequency, their spectral density of fluctuations can display extra peaks. The intensity of the peaks is quadratic in the modulation amplitude, for weak modulation. For systems where inertial effects can be disregarded, like an overdamped particle in a potential well, the peaks are generally located at zero frequency and at the modulation frequency. The widths of the peaks are characterized by the reciprocal correlation time of the system fluctuations in the absence of modulation and the noise correlation time. The spectra sensitively depend on the interrelation between these times and on the fluctuation intensity. They are determined not only by the fluctuations of the linear response, but also have a contribution from nonlinear response. The analytical results obtained for overdamped dynamical systems as well as two-state systems and systems with a threshold are in excellent agreement with numerical simulations.

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Date submitted: 12 Nov 2013

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