Lineshape of a Stochastic Oscillator with Two State Frequency Modulations

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The transformations of the lineshape with a fluctuating frequency for the Kubo-Anderson oscillator are considered. Assuming that the frequency of the oscillator fluctuates between two values and the rate of this fluctuation is a stochastic function of the time the analytical expression of the lineshape is obtained. It is assumed that the stochastic fluctuations of the potential barrier for the Kubo-Anderson oscillator lead to the stochastic fluctuations of the frequency. The transformations of the lineshape are extremely sensitive to the function, which describes the distributions of the frequency fluctuations. The obtained expression is applied to the different distributions of the fluctuation frequency rate. It is shown that a unusual type of the motional narrowing phenomenon is observed for the log-normal and log-Lorentzian distribution.