

## Equivalent Stochastic Linearization as an Alternative to Solving the Fokker–Planck Equation

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The popular procedure of equivalent stochastic linearization is widely used to estimate the mean and variance of the stationary response of nonlinear structural vibration systems. The procedure was independently proposed by three pioneers about fifty years ago. The primary reason for errors in the estimated statistics is the adoption of Gaussian probability distributions as substitutes for the true distributions of the nonlinear response processes. For the special case of Gaussian white-noise excitation it is known that the true stationary response distribution can be found by solving the Fokker-Planck equation associated with the Maxwell–Boltzmann equation. In the present paper it is shown that an alternative procedure for arriving at the same true distribution is to apply equivalent stochastic linearization to the Maxwell-Boltzmann equation. The procedure is illustrated for an array of particular examples, including power-law oscillators, Duffing's system, the double-well oscillator, and oscillators with transcendental restoring forces.

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