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An explicit description of the Lyapunov exponents of the noisy damped harmonic oscillator.

The Lyapunov exponents of the linearization

$$\ddot{x} = -x + \beta\dot{x} + \sigma\xi_t x$$

of a noisy Duffing-van der Pol oscillator are key quantities in the investigation of the stochastic bifurcation behaviour of the system. We derive a simple equation exhibiting them explicitly as functions of the second moment of the invariant measure of an associated diffusion with drift given by a potential function and additive noise, and, consequently, in terms of hypergeometric functions. This representation leads to different kinds of complete and explicit asymptotic expansions, as well as a rather complete account of global properties of the Lyapunov exponents as functions of β and σ. Our method can be extended to more general two-dimensional systems. This is joint work with C. Lederer.