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Addendum and Erratum:

Escape from a Metastable State [*J. Stat. Phys.* 42:105–148 (1986)] Peter Hanggi

In this note I update the above article with some relevant material and correct some minor misprints. Following eq. (2.7) one should state more precisely: If $U(x)$ is a **nonlinear** and **nonquadratic** potential field, analytical exact results for (2.7) within the full damping regime are not known. For a parabolic potential field (linear force), $U(x) = (M/2)\,\omega_0^2 x^2$, the eigenvalues and eigenfunctions are readily obtained (Ref. 41). In particular, the complex-valued eigenvalues read

$$\lambda_{n,m} = -\frac{1}{2}(n+m)\,\gamma + \frac{1}{2}\,i[4\omega_0^2 - \gamma^2]^{1/2}\,(n-m) \qquad n, m = 0, 1, \ldots$$

Approximate, analytical solutions for a bistable potential at intermediate and high friction can be found in: J. F. Gouyet and A. Bunde, *J. Stat. Phys.* **36**:43 (1984); *Physica* **132A**:357 (1985).

In the case of the strongly overdamped (Smoluchowski) case the boundary condition following (2.24) should be corrected to read

$$p_o(x \sim x_1) = \bar{p}(x \sim x_1)$$

For weakly damped systems, the equilibrium probability $\bar{p}(E)$, (2.41), for the energy depends, of course, on the inverse density of states $\nu(E)$ on the **dimension** of the reaction coordinate **x**. Equation (2.53c) should be completed by writing for the density of states $\psi(E)$

$$\psi(E) = \int d\Omega\, \delta[E - \mathscr{H}(\mathbf{\Omega})] \equiv 1/\nu(E) \qquad (2.53c)$$

The multidimensional generalization of (eqs. 2.38, 2.41–2.46, 2.51, 2.52, and 2.62 is then given with $\nu(E)$ determined from (2.53c). Moreover, it should also be noted that the rate exhibits in the weak friction regime a rather

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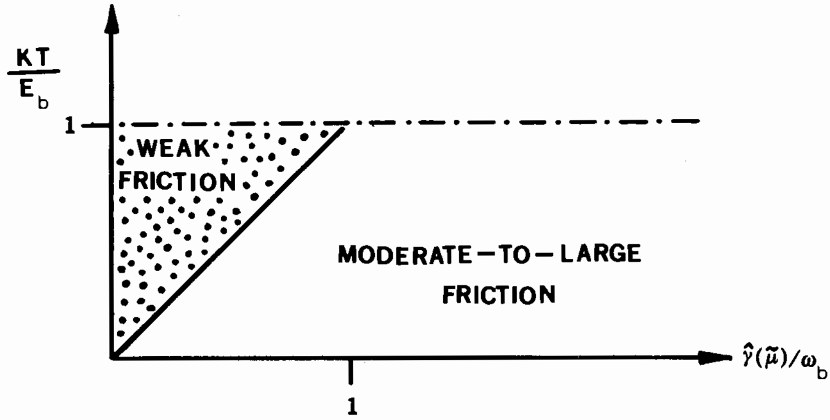

Fig. 1. Regime of validity of the various classical rate expressions as a function of the dimensionless parameters kT/E_b and $\hat{\gamma}(\tilde{\mu})/\omega_b$, with $\tilde{\mu}$ (memory friction) defined in (2.59). Weak-friction results (energy diffusion controlled regime): eqs. 2.43, 2.44, 2.45, 2.46, and 2.48; moderate-to-large friction: eqs. 2.20, 2.49, and 2.58; crossover regime: eqs. 2.46 and 2.64.

interesting sensitivity to the coupling strengths among the degrees of freedom **x**, modeling the reaction dynamics. Recently, this has been beautifully demonstrated in a study by M. Borkovec, J. E. Straub, and B. J. Berne, "The Influence of Intramolecular Vibrational Relaxation on the Pressure Dependence of Unimolecular Rate Constants", *J. Chem. Phys.* **85**:(in press).

Reference 70b, containing the informative numerical simulation data for escape driven by exponentially correlated Gaussian noise, should be completed as follows: J. E. Straub, M. Borkovec, and B. J. Berne, *J. Chem. Phys.* **84**:1788 (1986). Also, Ref. 109 should be complemented by adding the reference: A. J. Leggett, *Phys. Rev. B*, **30**:1208 (1984). In Ref. 20 we should add: G. Maneke, J. Schroeder, J. Troe, and F. Voss, *Ber. Bunsenges. Phys. Chem.* **89**:896 (1985).

Finally, we present here a rate-phase diagram which summarizes the regime of validity of the various classical rate expressions (Fig. 1).

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