Jung and Hänggi Reply: In the preceding Comment, Fox[1] numerically simulated the mean first-passage time (MFPT) of colored-noise–driven bistability. For his MFPT, T, the random walker starts at one well minimum with absorption taking place in the neighboring well minimum. At weak noise this MFPT, T, equals twice the MFPT, T_0, to reach the corresponding *separatrix* in x-ϵ phase space.[2] For small noise strength D, the inverse MFPT $T_0^{-1}=2T^{-1}$ becomes essentially independent of the precise starting point (x_0,ϵ_0) located within the neighborhood of the well minimum, and equals the lowest nonvanishing eigenvalue λ_1 of the *two-dimensional* Fokker-Planck equation [see Eqs. (1) and (2) in Ref. 1]. In Ref. 3 we have numerically determined this smallest eigenvalue λ_1 (error $<0.1\%$) as a function of the noise color τ by use of a matrix continued-fraction (MCF) method; this eigenvalue is denoted by λ_1(MCF). Fox's new simulation method *produces excellent agreement* between $\lambda_1(\text{NS})\equiv 2/T$ and λ_1(MCF) (NS denotes numerical simulation; see Table I in Ref. 1 and Fig. 1). For noise strengths $D>0.1$, T_0 becomes also dependent on the starting point (x_0,ϵ_0), and the identification $\lambda_1=T_0^{-1}$ starts to break down. Note also that the agreement between $-\ln\lambda_1$(MCF) and $-\ln\lambda_1(\text{NS})=-\ln(2/T)$ holds true for $D\leq 0.05$ with an accuracy better than 1%; i.e., λ_1(MCF) and $2/T$ agree better than 5%. In contrast, the validity of the steepest-descent approximation for λ_1, or equivalently T_0^{-1}, to the same accuracy (at $\tau=0$) is attained only at smaller noise strengths $D\leq 0.03$ (see Ref. 3).

The large first-passage times S (with MFPT, $\langle S\rangle=T$) are distributed exponentially, i.e., $\rho(S)=T^{-1}\exp(-S/T)$. This density does exhibit a very flat tail and thus it is necessary to consider trajectories with extremely large sojourn times. This in turn implies huge computation times. In view of these notorious difficulties which plague the evolution of large MFPT's, the accuracy of the new simulation method by Fox is impressive indeed!

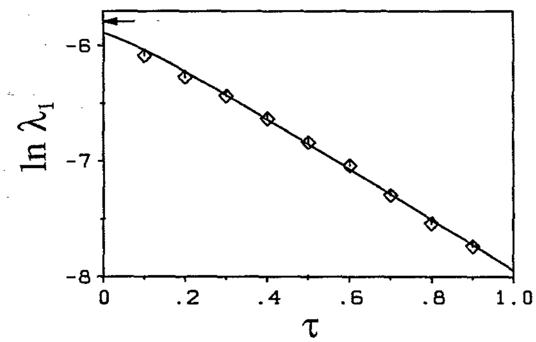

FIG. 1. Smallest nonzero eigenvalue λ_1(MCF) of the two-dimensional bistable non-Markovian flow for noise intensity $D=0.05$ vs noise correlation time τ (solid line); inverse MFPT of Fox $\lambda_1(\text{NS})=2/T$ (lozenges). The arrow denotes the steepest-descent value at $\tau=0$ i.e., $\lambda_1(\tau=0)=(\sqrt{2}/\pi)\times\exp(-1/4D)$.

P. Jung and P. Hänggi
Lehrstuhl für Theoretische Physik
Universität Augsburg
D-8900 Augsburg, Federal Republic of Germany

Received 1 August 1988
PACS numbers: 05.40.+j, 05.70.Ln

[1]R. F. Fox, preceding Comment, Phys. Rev. Lett. **62**, 1205 (1989); our notation is as in Ref. 1.

[2]P. Hänggi, P. Jung, and P. Talkner, Phys. Rev. Lett. **60**, 2804 (1988).

[3]P. Jung and P. Hänggi, Phys. Rev. Lett. **61**, 11 (1988).

