

Transport as a Consequence of State-Dependent Diffusion¹

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Overdamped particles subject to a drift in a force field with sinusoidal space dependence and also a sinusoidally modulated space-dependent diffusion, with the same period as the drift, experience a net driving force. The resulting current depends on the amplitude of the modulation of the diffusion and is a periodic function of the phase difference between the sinusoidal drift and the sinusoidal modulation of the diffusion. For small modulation amplitudes a particle subject to state-dependent noise behaves the same way as a particle subject to thermal noise but with a drift which, in addition to the sinusoidal term, contains a net force term [M. Büttiker, *Z. Phys. B* **68**:161 (1987)]. A specific example of this behavior [N. G. van Kampen, *IBM J. Res. Dev.* **32**:107 (1988); R. Landauer, *J. Stat. Phys.* **53**:233 (1988).] is the motion of overdamped particles in a ring subject to a nonuniform temperature field. When the drift and the temperature, which are periodic with a period equal to the ring circumference, are not in phase a noise-induced circulating current results.

KEY WORDS: State-dependent diffusion; noise-induced current; circulating currents.

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