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Chaotic Behavior of a Brownian Particle in a Periodic Potential

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Abstract: The classical deterministic dynamics of a Brownian particle with a time-dependent periodic perturbation in a spatially periodic potential is investigated. We have constructed a perturbed chaotic solution near the heteroclinic orbit of the nonlinear dynamics system by using the Constant-Variation method. Theoretical analysis and numerical result show that the motion of the Brownian particle is a kind of chaotic motion. The corresponding chaotic region in parameter space is obtained analytically and numerically.

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