Dynamical states and stochastic resonance of a particle in periodic bistable potential

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**Abstract**. We numerically solve the Langevin equation of motion[1-4] to obtain the trajectories and dynamical states of a particle in one-dimensional inhomogeneous periodic bistable potential *V(x)= V0[cos(x) + 2cos(2x)]*  system driven by a periodic force *F(t) = f0cos(ωt)* in presence of friction *γ(x,t) = γ0[1 – λcos(ωt + kx)]*. We choose the homogeneity parameter *λ* = 0.9 and study the stochastic resonance by solving the average (arithmetic mean) energy $<\overbar{W}$ > of the particle as a function of temperature *T* (thermal noise)[3-6]. We analyse the numerical results and attempt to find the arguable explanations.

References:

1. Einstein A 1905 On the movement of small particles suspended in stationary liquids required by the molecular-kinetic theory of heat *Ann. d. Phys.* **17** 549
2. Risken H 1988 *The Fokker-Planck Equation* (Springer – Verlag, Berlin)
3. Bani S K, Pohlong S S, Kharkongor D and Kharkongor B 2021 Stochastic resonance due to Bi-harmonic potential barrier in inhomogeneous medium *AIP Conf. Proc.* **2369** 020101
4. Reenbohn W L, Pohlong S S and Mahato C 2012 Periodically driven underdamped periodic and washboard potential systems: Dynamical states and stochastic resonance *Phys. Rev. E* **85** 031144
5. Dan D, Mahato M C and Jayannavar A M 1999 Mobility and stochastic resonance in spatially inhomogeneous systems *Phys. Rev. E* **60** 6421
6. Heinsalu E, Patriarca M and Marchesoni F 2009 Stochastic resonance in bistable confining potentials *Eur. Phys. J. B* **69** 19