鹿児島大学理学部物理学科

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1. 保存系と散逸系のカオス　古賀　均
2. Ni_2MnSn, Pd_2MnSnの光吸収スペクトル　高倉信行

1. 保存系と散逸系のカオス

古賀　均

Chaotic motions of a dissipative system (A) and a conservative system (B) are investigated.

(A); Dynamical behavior of a particle subject to a sinusoidal potential and driven by a periodic external field at zero temperature is studied numerically. Periodic, drifting and diffusive motions are observed and the properties of the motion depend on the amplitude and the angular frequency of the external field and the friction constant of the particle. The diffusion is caused by a chaotic motion of the deterministic system. The diffusion constants and the distribution functions are calculated for some ranges of parameters.

(B); A new model for a conservative semi-quantum system is presented to study quantum aspects of chaotic behavior. The model is made up of a pseudo-spin which interacts with an external field and the reaction field of the polarization of the pseudo-spin. The reaction field is superimposed upon the external field in the equations of motion and it brings nonlinear terms. Two isolating integrals, whose intersection curve gives an orbit, are obtained analytically in a static external field case, and phase plane plots are drawn using the integrals. The phase plane plots have three elliptic fixed points and one hyperbolic fixed point for a strong reaction field case and it has two elliptic ones and no hyperbolic one for a weak reaction field case. Only one single finite separatrix emanates from the hyperbolic fixed point in the strong reaction field case.

Chaotic motion is observed in a periodic external field case, and Poincaré mappings, Lyapunov exponents and power spectra of the polarization are calculated with the aid of computer simulations. The spectrum of 1-dimensional Lyapunov exponents takes a hyperbolic type [+, 0, −], namely the model has C-system like property.