

Dynamics of Ratchet Map

Taksu Cheon

Laboratory of Physics, Kochi University of Technology

Tosa Yamada, Kochi 782-8502, Japan

cheon@mech.kochi-tech.ac.jp

<http://www.mech.kochi-tech.ac.jp/cheon>

Abstract

We analyze the transport properties of a set of extensions of the Chirikov-Taylor Map which break both temporal and spatial reflection symmetries. We show that the simultaneous breaking of both symmetries result in the loss of periodicity in p -direction in the phase space dynamics, enabling the asymmetric diffusion which is the origin of the unidirectional ratchet motion. Replacement of the continuous dynamics by the discrete map enables us to look at the entire phase space structure with computational resources currently available, and even allows the calculation of the dynamical properties for the wide region in the controlling parameter space. We present the numerical results showing the intricate dependence of the asymmetric diffusion to the controlling parameters.

Reference

The slide used in the talk (16 Nov, 2000 at YITP, Kyoto Univ.) can be found in <http://www.mech.kochi-tech.ac.jp/cheon>

The full results will be reported in

T. Cheon, P. Exner and P. Seba, *in preparation* (2000)