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On the statistical and transport properties of a non-dissipative Fermi-Ulam model

Chaos **25**, 103107 (2015); <https://doi.org/10.1063/1.4930843>André L. P. Livorati^{1,2,3}, Carl P. Dettmann³, Iberê L. Caldas², and Edson D. Leonel^{1,4}[View Affiliations](#)[View Contributors](#)**Topics ▼** PDF

ABSTRACT

The transport and diffusion properties for the velocity of a Fermi-Ulam model were characterized using the decay rate of the survival probability. The system consists of an ensemble of non-interacting particles confined to move along and experience elastic collisions with two infinitely heavy walls. One is fixed, working as a returning mechanism of the colliding particles, while the other one moves periodically in time. The diffusion equation is solved, and the diffusion coefficient is numerically estimated by means of the averaged square velocity. Our results show remarkably good agreement of the theory and simulation for the chaotic sea below the first elliptic island in the phase space. From the decay rates of the survival probability, we obtained transport properties that can be extended to other nonlinear mappings, as well to billiard problems.

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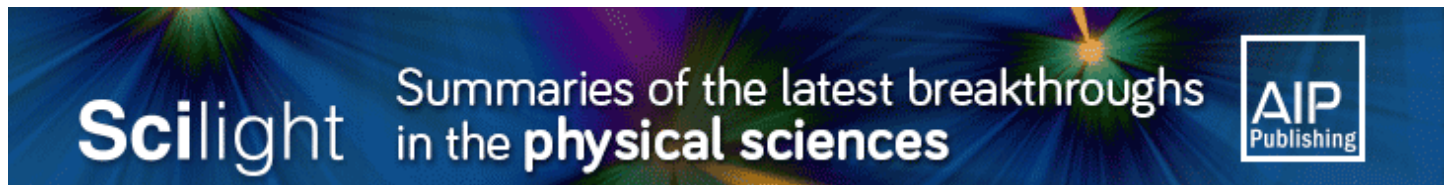
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