ORGANIZATION OF TRAJECTORIES IN FAMILIES IN WEAKLY OPEN BILLIARDS

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This paper investigates the formation of family trajectories in weakly open chaotic billiards. The methods used in this research were, firstly, computational simulations and analytical methods to study the problem. In the simulations, it was observed the particles initially inside the Sinai billiard which occasionally escape through a small hole (Δ) in one of the walls (L), being $\Delta << L$. Former observations demonstrated that when the billiard is non-hyperbolic, the decay curves show an algebraic late-time behavior, thus indicating formation of families in angles close to periodic trajectories. Therefore, firstly, it was defined the windows time where the decay curve presents exponential and algebraic behavior for different holes and geometry. Secondly, the surviving particles were classified according to their coordination in the phase space (θ angle of trajectory with the x axis) and they were both observed in different windows time and hole sizes. In the analytical part, a stochastic approach was used so that the decay curves could be deduced. Next, a Gaussian distribution was used for a random variable x, being $0 < x < 1$, as a parameter for a family trajectories classification, and a dispersive parameter σ was added in the distribution, thus regulating the transition from exponential to algebraic of the decay curves. Preliminary results about the behavior of σ concerning the geometry of billiard show that the surviving trajectories organize in families. It is expected that these results can contribute to check the effect of the hole size Δ in the mixing property of the system.