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The Iris Billiard: Critical Geometries and Global Chaos.

A new class of 2D billiards, defined by a unit circle enclosing a geometrically variable, central scattering ellipse is introduced.

The system exhibits mixed dynamics which is explored via Recurrence plots (RPs) and the associated recurrence quantification analysis (RQA), with a focus on long-term motion starting from the unstable period 2 orbit.

The main result shows the existence of a set of critical ellipse geometries at which the dynamics undergoes a transition to global chaos.

Further results show the existence of counterintuitive, fractal behaviours within a well defined variable space at the moment of dynamical transition at these critical geometries.

The presentation will conclude with possible explanations of these behaviours.

Field

Maths

Language

English

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