

Seminar in Nonlinear Systems

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Designing Chaotic Planar Billiards

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Abstract: Planar billiards (a billiard being the free motion of a point particle inside a domain, called *table*, with elastic reflections at the boundary) are among the most studied examples of dynamical systems, and especially of chaotic dynamical systems.

The typical ingredient that produces chaotic behavior, in dynamics, is hyperbolicity. Hyperbolic properties of billiards were first proven for dispersing tables (Sinai '70, Sinai-Bunimovich '73, etc.) and then for certain focusing tables (Bunimovich '79). Nowadays the main tool in proving hyperbolicity is the so-called *invariant cone technique*, which gives a practical way to show positivity of a Lyapunov exponent. When applied to billiards, this technique reduces the search for a chaotic table to a design problem in optics.

In this talk we introduce and discuss the main concepts of the invariant cone technique, together with its application to billiards, and present some possible developments in the field.

Refreshments provided