Bilhares e Suas Aplicações
em Outras Áreas da Matemática

João Lopes Dias (Universidade de Lisboa)
Title: Hyperbolic attractors for polygonal billiards with contracting reflection laws

Abstract: We will discuss polygonal billiards that contract the angle of reflection. This property originates a very different dynamical behavior from classical billiards. In particular, the billiard map becomes hyperbolic. We show the existence of attractors and SRB measures.

José Pedro Gaivão (Universidade de Lisboa)
Título: Bilhares hiperbólicos em politopos.

Resumo: O bilhar num politopo tem entropia nula quando a lei de reflexão é elástica. Nesta apresentação discutiremos uma classe de reflexões que contraem o ângulo de incidência na direcção da normal da face do politopo. Nesta classe de bilhares mostramos que, sob certas condições genéricas no politopo, a transformação do bilhar é hiperbólica. Trabalho em colaboração com Pedro Duarte e Mohammad Soufi.

Alexander Plakhov and Tatiana Tchemisova (Universidade de Aveiro)
Title: Problem of minimal resistance for oscillating bodies

Abstract: Consider the following mechanical problem. A convex 2D body moves through a highly rarefied medium on the plane and simultaneously makes slow oscillations with the amplitude T. It is required to find a roughening of the front part of the body surface minimizing the mean resistance of the medium to the body motion. The problem reduces to a Monge-Kantorovich-type problem of optimization of scattering of billiard by a flat surface. We solve this problem analytically when $0 < T < Pi/6$ and numerically when $Pi/6 < T < Pi/2$. The resistance decrease ratio goes to 0.5 and to (approx.) 0.987820 when T goes to 0 and Pi/2, respectively.

João Pedro Cruz and Alexander Plakhov (Universidade de Aveiro)
Title: Comparative study on efficiency of mirror retroreflectors

Abstract: A retroreflector is an optical device reversing the direction of incident beams of light. Two kinds of asymptotically perfect mirror retroreflectors, Notched angle and Tube, are known at present. We compare their efficiency, as well as the efficiency of the well-known mirror retroreflector called Square corner, assuming that the reflection coefficient is slightly less than 1. The study is partly analytic and partly numerical. We conclude that the retro-reflectivity ratio of Notched angle is normally much greater than those of Tube and Square corner.