



# Exterior Billiards: Systems with Impacts Outside Bounded Domains

*Alexander Plakhov*

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A billiard is a dynamical system in which a point particle alternates between free motion and specular reflections from the boundary of a domain. *Exterior Billiards* presents billiards in the complement of domains and their applications in aerodynamics and geometrical optics.

This book distinguishes itself from existing literature by presenting billiard dynamics *outside* bounded domains, including scattering, resistance, invisibility and retro-reflection. It begins with an overview of the mathematical notations used throughout the book and a brief review of the main results. Chapters 2 and 3 are focused on problems of minimal resistance and Newton's problem in media with positive temperature. In chapters 4 and 5, scattering of billiards by nonconvex and rough domains is characterized and some related special problems of optimal mass transportation are studied. Applications in aerodynamics are addressed next and problems of invisibility and retro-reflection within the framework of geometric optics conclude the text.

The book will appeal to mathematicians working in dynamical systems and calculus of variations. Specialists working in the areas of applications discussed will also find it useful.

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