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Geodesic Flows

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To Graciela

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Preface

The aim of this book is to present the fundamental concepts and properties of the geodesic flow of a closed Riemannian manifold. The topics covered are close to my research interests. An important goal here is to describe properties of the geodesic flow which do not require curvature assumptions. A typical example of such a property and a central result in this work is Mañé's formula that relates the topological entropy of the geodesic flow with the exponential growth rate of the average numbers of geodesic arcs between two points in the manifold.

The material here can be reasonably covered in a one-semester course. I have in mind an audience with prior exposure to the fundamentals of Riemannian geometry and dynamical systems.

I am very grateful for the assistance and criticism of several people in preparing the text. In particular, I wish to thank Leonardo Macarini and Nelson Möller who helped me with the writing of the first two chapters and the figures. Gonzalo Tornaría caught several errors and contributed with helpful suggestions. Pablo Spallanzani wrote solutions to several of the exercises. I have used his solutions to write many of the hints and answers. I also wish to thank the referee for a very careful reading of the manuscript and for a large number of comments with corrections and suggestions for improvement.

This book grew out of lectures which I gave at Bahía Blanca and Córdoba (Argentina) in 1996, IMPA (Río de Janeiro, Brasil) in 1997 and Montevideo (Uruguay) in 1998. Part of the text was written while I was visiting IMPA during the second semester of 1997 and the ICTP in Trieste during the first two months of 1998. I wish to thank them for their hospitality.

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Gabriel Pedro Paternain
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