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Sinopsis

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This volume offers an expanded version of lectures given at the Courant Institute on the theory of Sobolev spaces on Riemannian manifolds. "Several surprising phenomena appear when studying Sobolev spaces on manifolds," according to the author. "Questions that are elementary for Euclidean space become challenging and give rise to sophisticated mathematics, where the geometry of the manifold plays a central role."

The volume is organized into nine chapters. Chapter 1 offers a brief introduction to differential and Riemannian geometry. Chapter 2 deals with the general theory of Sobolev spaces for compact manifolds. Chapter 3 presents the general theory of Sobolev spaces for complete, noncompact manifolds. Best constants problems for compact manifolds are discussed in Chapters 4 and 5. Chapter 6 presents special types of Sobolev inequalities under constraints. Best constants problems for complete noncompact manifolds are discussed in Chapter 7. Chapter 8 deals with Euclidean-type Sobolev inequalities. And Chapter 9 discusses the influence of symmetries on Sobolev embeddings. An appendix offers brief notes on the case of manifolds with boundaries.

This topic is a field undergoing great development at this time. However, several important questions remain open. So a substantial part of the book is devoted to the concept of best constants, which appeared to be crucial for solving limiting cases of some classes of PDEs.

The volume is highly self-contained. No familiarity is assumed with differentiable manifolds and Riemannian geometry, making the book accessible to a broad audience of readers, including graduate students and researchers.

Titles in this series are co-published with the Courant Institute of Mathematical Sciences at New York University.