Topics in Extrinsic Geometry of Codimension-One Foliations (SpringerBriefs in Mathematics)

Vladimir Rovenski, Pawel Walczak

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Extrinsic geometry describes properties of foliations on Riemannian manifolds which can be expressed in terms of the second fundamental form of the leaves. The authors of *Topics in Extrinsic Geometry of Codimension-One Foliations* achieve a technical tour de force, which will lead to important geometric results.

The *Integral Formulae*, introduced in chapter 1, is a useful for problems such as: prescribing higher mean curvatures of foliations, minimizing volume and energy defined for vector or plane fields on manifolds, and existence of foliations whose leaves enjoy given geometric properties. The Integral Formulae steams from a Reeb formula, for foliations on space forms which generalize the classical ones. For a special auxiliary functions the formulae involve the Newton transformations of the Weingarten operator.

The central topic of this book is *Extrinsic Geometric Flow* (EGF) on foliated manifolds, which may be a tool for prescribing extrinsic geometric properties of foliations. To develop EGF, one needs *Variational Formulae*, revealed in chapter 2, which expresses a change in different extrinsic geometric quantities of a fixed foliation under leaf-wise variation of the Riemannian Structure of the ambient manifold. Chapter 3 defines a general notion of EGF and studies the evolution of Riemannian metrics along the trajectories of this flow(e.g., describes the short-time existence and uniqueness theory and estimate the maximal existence time).Some special solutions (called *Extrinsic Geometric Solutions*) of EGF are presented and are of great interest, since they provide Riemannian Structures with very particular geometry of the leaves.

This work is aimed at those who have an interest in the differential geometry of submanifolds and foliations of Riemannian manifolds.

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