

Differential Geometry of Curves and Surfaces with Singularities

This book provides a unique and highly accessible approach to singularity theory from the perspective of differential geometry of curves and surfaces. It is written by three leading experts on the interplay between two important fields — singularity theory and differential geometry.

The book introduces singularities and their recognition theorems, and describes their applications to geometry and topology, restricting the objects of attention to singularities of plane curves and surfaces in the Euclidean 3-space. In particular, by presenting the singular curvature, which originated through research by the authors, the Gauss–Bonnet theorem for surfaces is generalized to those with singularities. The Gauss–Bonnet theorem is intrinsic in nature, that is, it is a theorem not only for surfaces but also for 2-dimensional Riemannian manifolds. The book also elucidates the notion of Riemannian manifolds with singularities.

These topics, as well as elementary descriptions of proofs of the recognition theorems, cannot be found in other books. Explicit examples and models are provided in abundance, along with insightful explanations of the underlying theory as well. Numerous figures and exercise problems are given, becoming strong aids in developing an understanding of the material.

Readers will gain from this text a unique introduction to the singularities of curves and surfaces from the viewpoint of differential geometry, and it will be a useful guide for students and researchers interested in this subject.

