

# Preface

Vector fields on manifolds play major roles in mathematics and other sciences. In particular, the Poincaré–Hopf index theorem and its geometric counterpart, the Gauss–Bonnet theorem, give rise to the theory of Chern classes, key invariants of manifolds in geometry and topology.

One has often to face problems where the underlying space is no more a manifold but a singular variety. Thus it is natural to ask what is the “good” notion of index of a vector field, and of Chern classes, if the space acquires singularities. The question was explored by several authors with various answers, starting with the pioneering work of M.-H. Schwartz and R. MacPherson.

We present these notions in the framework of the obstruction theory and the Chern–Weil theory. The interplay between these two methods is one of the main features of the monograph.

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