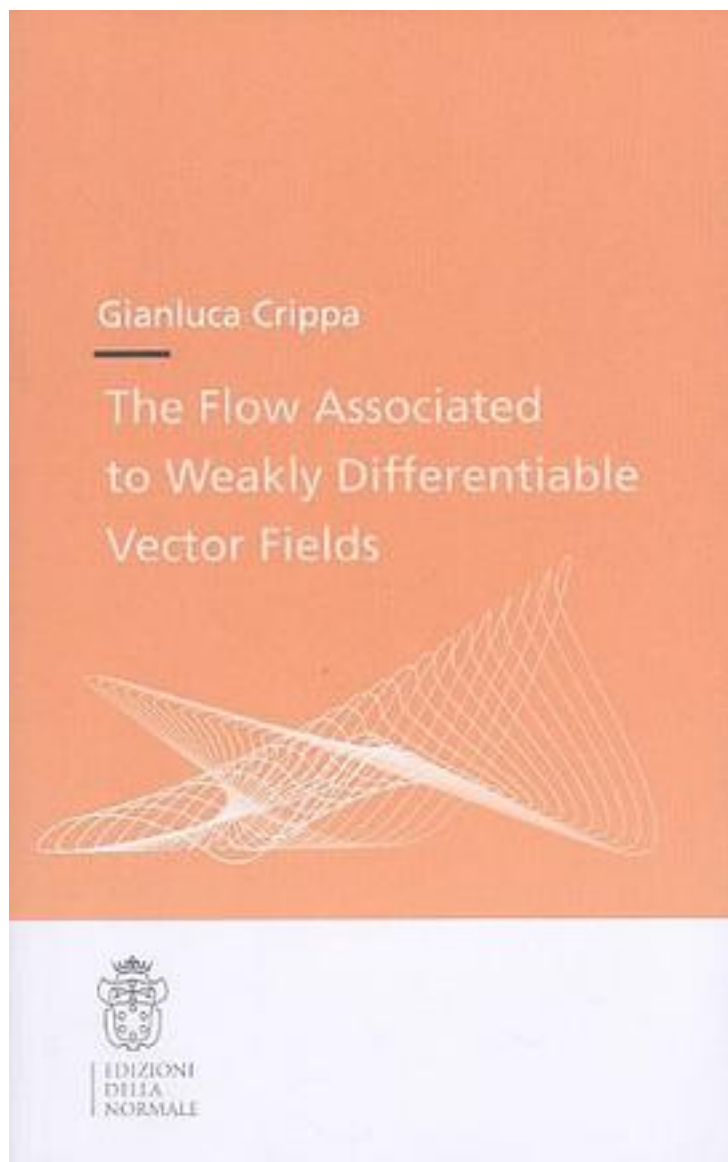


The Flow Associated to Weakly Differentiable Vector Fields



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The aim of this book is to provide a self-contained introduction and an up-to-date survey on many aspects of the theory of transport equations and ordinary differential equations with non-smooth velocity fields. The interest in this topic is motivated by important issues in nonlinear PDEs, in particular conservation laws and fluid mechanics. A fascinating feature of this research area, which is currently of concern in mathematics, is the interplay between PDE techniques and geometric measure theory techniques. Several masterpieces appear in the related literature, balancing completely rigorous proofs with more heuristic arguments. A consistent part of the book is based on results obtained by the author in collaboration with other mathematicians. After a short introduction to the classical smooth theory, the book is divided into two parts. The first part focuses on the PDE aspect of the problem, presenting some general tools of this analysis, many well-posedness results, an abstract characterization of the well-posedness, and some examples showing the sharpness of the assumptions made. The second part, instead, deals with the ODE aspect of the problem, respectively by an abstract connection with the PDE, and by some direct and simple (but powerful) a priori estimates.

作者介绍:

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