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Lectures On Nonlinear Hyperbolic Differential Equations (Mathématiques Et Applications)

MATHÉMATIQUES & APPLICATIONS 26

Lars Hörmander

Lectures on Nonlinear Hyperbolic Differential Equations

SMAI

Springer
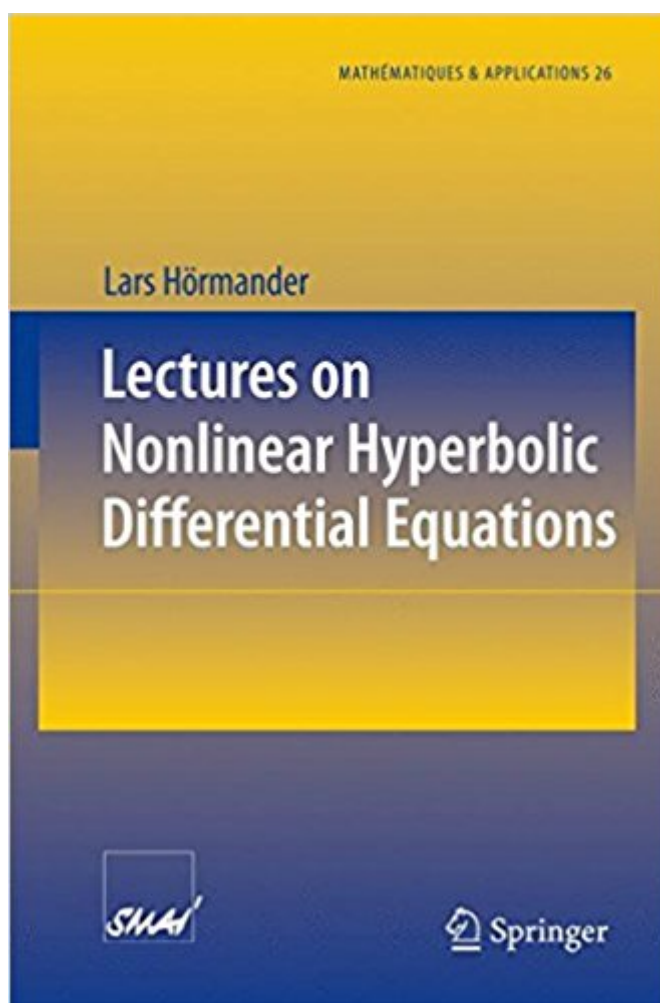
Synopsis

In this introductory textbook, a revised and extended version of well-known lectures by L. Hörmander from 1986, four chapters are devoted to weak solutions of systems of conservation laws. Apart from that the book only studies classical solutions. Two chapters concern the existence of global solutions or estimates of the lifespan for solutions of nonlinear perturbations of the wave or Klein-Gordon equation with small initial data. Four chapters are devoted to microanalysis of the singularities of the solutions. This part assumes some familiarity with pseudodifferential operators which are standard in the theory of linear differential operators, but the extension to the more exotic classes of opertors needed in the nonlinear theory is presented in complete detail.

Book Information

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Customer Reviews

HÃ¶rmanders book in this subject is interesting, very interesting. Partly because it addresses nonlinear hyperbolic operators, and that is unusual. Almost any book in this subject would stay with the linear setting, and the hyperbolic non-linear notion is very tied to the field equations of Quantum Field Theory(QFT), which are usually hyperbolic and non-linear. A propagating wave after a boat follows a hyperbolic equation, and it is natural to ask what would have if we deform it to a non-linear hyperbolic problem. Much the same in QFT, where equations like the Dirac equation and the, of course non-linear, Yang-Mills equation are hyperbolic in Minkowski space-time or for that manner on any pseudo-Riemannian manifold of appropriate singnature.Now, physicists usually attack this

via a holomorphic perspective on elliptic problems, where as many mathematicans would look at the relevant Cauchy problem, which may also be overdetermined or behave differently in different settings. There are very big differences between the elliptic and hyperbolic setting for non-linear operators(Indeed there are very large differences even in the linear setting.). The questions that arise are very delicate. And it is here that this book comes into play. Read it!

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