

1. Record Nr.	UNINA9910506379703321
Autore	Markfelder Simon
Titolo	Convex integration applied to the multi-dimensional compressible Euler equations / / Simon Markfelder
Pubbl/distr/stampa	Cham, Switzerland : , : Springer, , [2021] ©2021
ISBN	3-030-83785-8
Descrizione fisica	1 online resource (244 pages)
Collana	Lecture Notes in Mathematics ; ; v.2294
Classificazione	35Q31 76N10 35L65 35L45 35L50
Disciplina	515.35
Soggetti	Differential equations Physics Global analysis (Mathematics) Equacions de Lagrange Funcions convexes Integració numèrica Problemes de contorn Llibres electrònics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Intro -- Preface -- Contents -- Part I The Problem Studied in This Book -- 1 Introduction -- 1.1 The Euler Equations -- 1.2 Weak Solutions and Admissibility -- 1.3 Overview on Well-Posedness Results -- 1.4 Structure of This Book -- 2 Hyperbolic Conservation Laws -- 2.1 Formulation of a Conservation Law -- 2.2 Initial Boundary Value Problem -- 2.3 Hyperbolicity -- 2.4 Companion Laws and Entropies -- 2.5 Admissible Weak Solutions -- 3 The Euler Equations as a Hyperbolic System of Conservation Laws -- 3.1 Barotropic Euler System -- 3.1.1 Hyperbolicity -- 3.1.2 Entropies -- 3.1.3 Admissible Weak Solutions -- 3.2 Full Euler System -- 3.2.1 Hyperbolicity -- 3.2.2 Entropies -- 3.2.3

Admissible Weak Solutions -- Part II Convex Integration -- 4
 Preparation for Applying Convex Integration to Compressible Euler --
 4.1 Outline and Preliminaries -- 4.1.1 Adjusting the Problem -- 4.1.2
 Tartar's Framework -- 4.1.3 Plane Waves and the Wave Cone -- 4.1.4
 Sketch of the Convex Integration Technique -- 4.2 -Convex Hulls --
 4.2.1 Definitions and Basic Facts -- 4.2.2 The HN-Condition and a Way
 to Define U -- 4.2.3 The -Convex Hull of Slices -- 4.2.4 The -Convex
 Hull if the Wave Cone is Complete -- 4.3 The Relaxed Set U Revisited
 -- 4.3.1 Definition of U -- 4.3.2 Computation of U -- 4.4 Operators --
 4.4.1 Statement of the Operators -- 4.4.2 Lemmas for the Proof of
 Proposition 4.4.1 -- 4.4.3 Proof of Proposition 4.4.1 -- 5
 Implementation of Convex Integration -- 5.1 The Convex-Integration-
 Theorem -- 5.1.1 Statement of the Theorem -- 5.1.2 Functional Setup
 -- 5.1.3 The Functionals I_0 and the Perturbation Property -- 5.1.4
 Proof of the Convex-Integration-Theorem -- 5.2 Proof of the
 Perturbation Property -- 5.2.1 Lemmas for the Proof -- 5.2.2 Proof of
 Lemma 5.2.4 -- 5.2.3 Proof of Lemma 5.2.1 Using Lemmas 5.2.2, 5.2.3
 and 5.2.4.
 5.2.4 Proof of the Perturbation Property Using Lemma 5.2.1 -- 5.3
 Convex Integration with Fixed Density -- 5.3.1 A Modified Version of
 the Convex-Integration-Theorem -- 5.3.2 Proof the Modified
 Perturbation Property -- Part III Application to Particular Initial
 (Boundary) Value Problems -- 6 Infinitely Many Solutions of the Initial
 Boundary Value Problem for Barotropic Euler -- 6.1 A Simple Result on
 Weak Solutions -- 6.2 Possible Improvements to Obtain Admissible
 Weak Solutions -- 6.3 Further Possible Improvements -- 7 Riemann
 Initial Data in Two Space Dimensions for Isentropic Euler -- 7.1 One-
 Dimensional Self-Similar Solution -- 7.2 Summary of the Results on
 Non-/Uniqueness -- 7.3 Non-Uniqueness Proof if the Self-Similar
 Solution Consists of One Shock and One Rarefaction -- 7.3.1 Condition
 for Non-Uniqueness -- 7.3.2 The Corresponding System of Algebraic
 Equations and Inequalities -- 7.3.3 Simplification of the Algebraic
 System -- 7.3.4 Solution of the Algebraic System if the Rarefaction is
 "Small" -- 7.3.5 Proof of Theorem 7.3.1 via an Auxiliary State -- 7.4
 Sketches of the Non-Uniqueness Proofs for the Other Cases -- 7.4.1
 Two Shocks -- 7.4.2 One Shock -- 7.4.3 A Contact Discontinuity and at
 Least One Shock -- 7.5 Other Results in the Context of the Riemann
 Problem -- 8 Riemann Initial Data in Two Space Dimensions for Full
 Euler -- 8.1 One-Dimensional Self-Similar Solution -- 8.2 Summary of
 the Results on Non-/Uniqueness -- 8.3 Non-Uniqueness Proof if the
 Self-Similar Solution Contains Two Shocks -- 8.3.1 Condition for Non-
 Uniqueness -- 8.3.2 The Corresponding System of Algebraic Equations
 and Inequalities -- 8.3.3 Solution of the Algebraic System -- 8.4
 Sketches of the Non-Uniqueness Proofs for the Other Cases -- 8.4.1
 One Shock and One Rarefaction -- 8.4.2 One Shock -- 8.5 Other
 Results in the Context of the Riemann Problem.
 A Notation and Lemmas -- A.1 Sets -- A.2 Vectors and Matrices -- A.
 2.1 General Euclidean Spaces -- A.2.2 The Physical Space and the
 Space-Time -- A.2.3 Phase Space -- A.3 Sequences -- A.4 Functions
 -- A.4.1 Basic Notions -- A.4.2 Differential Operators -- Functions of
 Time and Space -- Functions of the State Vector -- A.4.3 Function
 Spaces -- A.4.4 Integrability Conditions -- A.4.5 Boundary Integrals
 and the Divergence Theorem -- A.4.6 Mollifiers -- A.4.7 Periodic
 Functions -- A.5 Convexity -- A.5.1 Convex Sets and Convex Hulls --
 A.5.2 Convex Functions -- A.6 Semi-Continuity -- A.7 Weak-
 Convergence in L -- A.8 Baire Category Theorem -- Bibliography --
 Index.
