

# CONTENTS

|                |     |
|----------------|-----|
| Foreword ..... | v   |
| Preface .....  | vii |

## PART I: GENERAL SURVEY LECTURES

|                                                                                                                      |     |
|----------------------------------------------------------------------------------------------------------------------|-----|
| Open questions in the theory of one dimensional<br>hyperbolic conservation laws .....                                | 1   |
| <i>Alberto Bressan</i>                                                                                               |     |
| Multidimensional conservation laws: Overview,<br>problems, and perspective .....                                     | 23  |
| <i>Gui-Qiang G. Chen</i>                                                                                             |     |
| Mathematical analysis of fluids in motion .....                                                                      | 73  |
| <i>Eduard Feireisl</i>                                                                                               |     |
| Selected topics in approximate solutions<br>of nonlinear conservation laws. High-resolution<br>central schemes ..... | 101 |
| <i>Eitan Tadmor</i>                                                                                                  |     |
| Stability and dynamics of viscous shock waves .....                                                                  | 123 |
| <i>Kevin Zumbrun</i>                                                                                                 |     |

## PART II: SPECIALIZED RESEARCH LECTURES

|                                                                                                                        |     |
|------------------------------------------------------------------------------------------------------------------------|-----|
| Mathematical aspects of a model for granular flow .....                                                                | 169 |
| <i>Debora Amadori and Wen Shen</i>                                                                                     |     |
| The flow associated to weakly differentiable<br>vector fields: recent results and open problems .....                  | 181 |
| <i>Luigi Ambrosio</i>                                                                                                  |     |
| Existence and uniqueness results for the continuity<br>equation and applications to the chromatography<br>system ..... | 195 |
| <i>Luigi Ambrosio, Gianluca Crippa,<br/>Alessio Figalli, and Laura V. Spinolo</i>                                      |     |

|                                                                                                                                       |     |
|---------------------------------------------------------------------------------------------------------------------------------------|-----|
| Finite energy weak solutions to the quantum hydrodynamics system .....                                                                | 205 |
| <i>Paolo Antonelli and Pierangelo Marcati</i>                                                                                         |     |
| The Monge problem in geodesic spaces .....                                                                                            | 217 |
| <i>Stefano Bianchini and Fabio Cavalletti</i>                                                                                         |     |
| Existence of a unique solution to a nonlinear moving-boundary problem of mixed type arising in modeling blood flow .....              | 235 |
| <i>Sunčica Čanić, Andro Mikelić, Tae-Beom Kim, and Giovanna Guidoboni</i>                                                             |     |
| Transonic flows and isometric embeddings .....                                                                                        | 257 |
| <i>Gui-Qiang G. Chen, Marshall Slemrod, and Dehua Wang</i>                                                                            |     |
| Well posedness and control in models based on conservation laws .....                                                                 | 267 |
| <i>Rinaldo M. Colombo</i>                                                                                                             |     |
| Homogenization of nonlinear partial differential equations in the context of ergodic algebras: Recent results and open problems ..... | 279 |
| <i>Hermano Frid and Jean Silva</i>                                                                                                    |     |
| Conservation laws at a node .....                                                                                                     | 293 |
| <i>Mauro Garavello</i>                                                                                                                |     |
| Nonlinear hyperbolic surface waves .....                                                                                              | 303 |
| <i>John K. Hunter</i>                                                                                                                 |     |
| Vacuum in gas and fluid dynamics .....                                                                                                | 315 |
| <i>Juhi Jang and Nader Masmoudi</i>                                                                                                   |     |
| On radially symmetric solutions to conservation laws .....                                                                            | 331 |
| <i>Helge Kristian Jenssen</i>                                                                                                         |     |
| Charge transport in an incompressible fluid: New devices in computational electronics .....                                           | 353 |
| <i>Joseph W. Jerome</i>                                                                                                               |     |

|                                                                                                   |     |
|---------------------------------------------------------------------------------------------------|-----|
| Localization and shear bands in high strain-rate<br>plasticity .....                              | 365 |
| <i>Theodoros Katsaounis and Athanasios Tzavaras</i>                                               |     |
| Hyperbolic conservation laws on spacetimes .....                                                  | 379 |
| <i>Philippe G. LeFloch</i>                                                                        |     |
| Reduced theories in nonlinear elasticity .....                                                    | 393 |
| <i>Marta Lewicka</i>                                                                              |     |
| Mathematical, physical and numerical principles<br>essential for models of turbulent mixing ..... | 405 |
| <i>Hyunkyung Lim, Yan Yu, James Glimm,<br/>and David H. Sharp</i>                                 |     |
| On the Euler-Poisson equations of self-gravitating<br>compressible fluids .....                   | 415 |
| <i>Tao Luo and Joel Smoller</i>                                                                   |     |
| Viscous system of conservation laws: Singular limits .....                                        | 433 |
| <i>Denis Serre</i>                                                                                |     |
| A two-dimensional Riemann problem for scalar<br>conservation laws .....                           | 447 |
| <i>Hao Ying and Barbara Lee Keyfitz</i>                                                           |     |
| Semi-hyperbolic waves in two-dimensional<br>compressible Euler systems .....                      | 457 |
| <i>Yuxi Zheng</i>                                                                                 |     |
| IMA summer program participants .....                                                             | 469 |

<http://www.springer.com/978-1-4419-9553-7>

Nonlinear Conservation Laws and Applications

Bressan, A.; Chen, G.-Q.G.; Lewicka, M.; Wang, D. (Eds.)

2011, XII, 490 p., Hardcover

ISBN: 978-1-4419-9553-7