Preface

The topic of the 2010 Abel Symposium was Nonlinear Partial Differential Equations. The study of differential equations is of fundamental importance in mathematics and in almost all of the applications of mathematics in natural sciences, economics, and engineering. This area of mathematics is currently in the midst of an unprecedented development worldwide. Differential equations are used to model phenomena of increasing complexity, and in areas that have traditionally been outside the realm of mathematics. New analytical tools and mathematical theories, coupled with new numerical methods, are dramatically improving our understanding of nonlinear models. Nonlinearity gives raise to solutions having singularities, oscillations, or concentration effects, which in the real world are reflected in the appearance of shock waves, turbulence, material defects, etc. These effects frequently require new techniques, and offer challenging novel problems for mathematicians. On the other hand, new mathematical developments provide (numerical) solutions and new insight in many applications. The purpose of these Abel Symposium proceedings is to present a selection of the latest exciting results by world leading researchers in the area of nonlinear partial differential equations.

The Abel Symposium was hosted at the Norwegian Academy of Science and Letters, Oslo, from September 28 to October 2, 2010. Attendance was by invitation only, and the symposium had a total of 74 participants, out of which 32 were from Norwegian universities. The Scientific Committee consisted of Alberto Bressan (Penn State), Helge Holden (Trondheim), Kenneth H. Karlsen (Oslo), Sergiu Klainerman (Princeton), and Eitan Tadmor (Maryland).

Talks were presented by

Luigi Ambrosio (Pisa)
Alberto Bressan (Penn State)
Luis A. Caffarelli (Texas)
Gui-Qiang Chen (Oxford)
Camillo De Lellis (Zürich)
Maria J. Esteban (Paris)
Eduard Feireisl (Prague)
Gerhard Huisken (Golm)
Carlos Kenig (Chicago)
Alex Kiselev (Madison)
Sergiu Klainerman (Princeton)
Robert V. Kohn (New York)
Pierre-Louis Lions (Paris)
Andrew J. Majda (New York)
Igor Rodnianski (Princeton)
Laure Saint-Raymond (Paris)
Eitan Tadmor (Maryland)
Juan Luis Vazquez (Madrid)
Cédric Villani (Lyon)

These proceedings include most of the lectures presented at the Abel Symposium, and the editors appreciate the efforts made by the speakers to present their talks in these proceedings.

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