Preface

The Fifth European Congress of Mathematics (5ECM) took place from July 14–18, 2008 in the RAI Convention Center Amsterdam. It was organized by the Centrum Wiskunde en Informatica Amsterdam, the University of Amsterdam, and the VU University Amsterdam, under auspices of the European Mathematical Society. Included in this congress was the 44th Nederlands Mathematisch Congres, the yearly congress of the Royal Dutch Mathematical Society (KWG). 5ECM stood under the special patronage of the KWG. Previous European Congresses of Mathematics were held in Paris (1992), Budapest (1996), Barcelona (2000), and in Stockholm (2004).

About 1000 mathematicians from 68 different countries attended the congress.

The first of ten plenary lectures, to get the congress started, was delivered by Richard Taylor. As all the other plenary lecturers, he did a wonderful job of explaining his work to a general mathematical audience. Another major item on the programme were three science lectures. These lectures outlined applications of mathematics in other sciences. Mathematical modeling plays a crucial role in predicting climate change, as was stressed by Tim Palmer (European Centre for Medium Range Weather Forecasts). He also outlined what would be necessary to improve on the current state of affairs in the mathematical modeling to obtain predictions on a finer scale than is possible at the moment. Ignacio Cirac (Max Planck Institute für Quantenoptik) discussed quantum information theory, and the challenges in this area. The third science lecture was given by Jonathan Sherratt (Heriot-Watt University) who talked about the latest developments in mathematical modeling for population dynamics. Thirty-three invited lectures were presented in sessions of four or five parallel talks.

As in the four preceding EMS congresses, ten EMS prizes were given to young researchers, not older than 35 years, who had been selected by a Prize Committee appointed by the EMS. In addition, the Felix Klein Prize was awarded for the second time, jointly by the EMS and the Institute for Industrial Mathematics in Kaiserslautern, for an application of mathematics to a concrete and difficult industrial problem.

There were twenty-two minisymposia, spread over the whole mathematical area. These minisymposia played a role in attracting people to the ECM meeting that would otherwise perhaps not have come to such a broad mathematics congress. The organizers are grateful to the organizers of the minisymposia for their valuable help.

Two Round Table meetings were organized: one on Industrial Mathematics and one on Mathematics and Developing Countries.

As part of the 44th Nederlands Mathematisch Congres, the so-called Brouwer lecture was given, by Phillip Griffiths of IAS Princeton. The Brouwer lecture is or-

ganized every three years by the KWG. The Brouwer lecturer receives a gold medal commemorating the Dutch mathematician L. J. Brouwer. The Brouwer lecture with the Brouwer medal is The Netherlands' most prestigious award in mathematics. Information about Brouwer was given by Dirk van Dalen in an invited historical lecture during the congress. Other parts of NMC44 were the 9th Beeger lecture by Dan Bernstein of the University of Illinois at Chicago (organized once every two years to commemorate the Dutch number theorist N. G. W. H. Beeger and sponsored by CWI Amsterdam) and the third Philips PhD prize lectures for Dutch PhD students (sponsored by Philips Eindhoven and this time won by Erik Jan van Leeuwen of CWI Amsterdam).

These proceedings present extended versions of nineteen of the invited talks which were delivered during 5ECM. We are grateful to the authors for their contributions and to the following referees: Keith Ball, Henk Broer, Arjeh Cohen, Gerard van der Geer, Robbert Dijkgraaf, Klaas Landsman, Eduard Looijenga, Terry Lyons, Yvan Martel, Andrzej Pelczar, Nicolai Reshetikhin, David Riley, Benjamin Rossman, Marta Sanz-Solé, Floris Takens, Constantin Teleman, Rob Tijdeman, Bruno Vallette, and Don Zagier.

A congress of this size is impossible to organize without generous financial support from the government, businesses and industry, and the local mathematical community. The full list of subsidy-providers and sponsors is given in the section Sponsors of these Proceedings. Although all subsidy-providers and sponsors are equally appreciated, we like to single out the most important ones here. The largest single subsidy was provided by NWO, the Netherlands Organization for Scientific Research. Biggest sponsors were Foundation Compositio Mathematica and ING Corporation.

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