PREFACE

The Sixth International Workshop on Mathematical Aspects of Fluid and Plasma Dynamics (MAFPD) was held at Kyoto University, Kyoto, Japan, on September 19 – 23, 2004. This issue of *Bulletin of the Institute of Mathematics, Academia Sinica (New Series)* is devoted to the papers presented at the workshop. Three members of the organizing committee, K. Aoki, P. Degond, and R. Illner, participated in the editorial process as guest editors.

The first MAFPD Workshop was held in Trieste (Italy) in 1984, and the subsequent workshops have been held irregularly: the 2nd workshop in Orsay (France) in 1985, the 3rd in Salice Terme (Italy) in 1988, the 4th in Kyoto (Japan) in 1991, and the 5th in Maui (Hawaii, USA) in 1998. The aim of the MAFPD Workshop is to promote interactions between applied mathematicians, physicists, and engineers working on fluid and plasma dynamics. The peculiarity of this workshop is that there is no standing committee for organization. It has been organized by individuals who appreciated the necessity for and timeliness of the workshop.

The fact that it had not been held since 1998 was strong motivation for the 6th MAFPD Workshop. The Tenth International Conference on Hyperbolic Problems: Theory, Numerics, and Application (HYP2004), which had already been scheduled to be held in Osaka on September 13–17, 2004, led naturally to the idea of organizing the 6th MAFPD Workshop just after HYP2004. In fact, this idea turned out to spawn a very successful workshop. The total number of participants was 99, with 73 from outside Japan. The program included 12 plenary (45-min) lectures and 65 invited (30-min) lectures. The 6th MAFPD Workshop aimed at providing an opportunity to present recent progress and obtain information about new directions for leading researchers working on mathematical aspects of fluids and plasmas in a broad sense. In particular, the relation between kinetic and fluid models in various applications such as gas dynamics, semiconductors, and granular flows was one of the main subjects. Theory and application of the following subjects were included in the scope of the Workshop: the Boltzmann equation and related kinetic equations; the Vlasov-Poisson system and related equations; the Navier-Stokes and Euler equations; kinetic and fluid models for various flow phenomena (e.g., rarefied gas flows, granular flows,

semiconductors, and traffic flows); quantum and relativistic kinetic systems; and asymptotic and numerical methods. The lectures delivered during the Workshop were in general of high quality, and stimulating discussions were held throughout the Workshop.

The chair of the organizing committee (K.A.) thanks all the members of the scientific and organizing committees for their help. It must also be stressed that the 6th MAFPD Workshop could not have been realized without the financial support of the organizations listed below. Thanks are also due to the staff and students at the Department of Aeronautics and Astronautics, Kyoto University, especially Prof. S. Takata and Dr. S. Kosuge, who devoted much time and effort to the preparation and execution of the Workshop. Last but not least, we would like to thank all the participants to the 6th MAFPD Workshop and those who have contributed to this special issue.

These proceedings were originally intended to be published elsewhere, but although the refereeing process for all papers had been completed by August 2005, the publication process was still not completed early in 2007. As guest editors, we considered such a delay unacceptable and decided to withdraw the proceedings from the original journal.

We are immensely grateful to Prof. T.-P. Liu, Director of the Institute of Mathematics, Academia Sinica Taiwan, for his help in publishing the proceedings in this current issue of the Bulletin. We also thank Dr. C.-H. Chang, Managing Editor of the Bulletin, for his efficient editorial work.

March 2007

<div align="right">

Kazuo Aoki, Pierre Degond, Reinhard Illner
Guest Editors

</div>