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Nonlinear Processes in Geophysics

Preface

Coupling between large and small scale turbulence in space and laboratory plasmas

The International Workshop on Nonlinear Waves and Turbulence in Space Plasmas is held every two or three years, with its location alternating around the US, Europe, and Asia. Previous Workshops have been held in Kyoto Japan (1994), Köln Germany (1997), Carlsbad California (1999), Tromsø Norway (2001), Mumbai India (2003), Fukuoka Japan (2006). The seventh edition (NLW-7) took place in Beaulieu (on the French Riviera near Nice), 20–24 April 2008. It was attended by space and laboratory plasma physicists, astrophysicists as well as mathematicians.

The NLW-7 workshop has covered many aspects of nonlinear processes in various plasma environments such as the solar wind, the magnetosheath, the ionosphere, or fusion plasmas, using both MHD and kinetic descriptions. Emphasis was put on turbulent cascades from MHD to electron scales and on electron acceleration processes.

This volume gathers several comprehensive articles contributing to the understanding of turbulence in space plasmas. They cover theoretical aspects such as wave turbulence in MHD, Hall-MHD or electron MHD, and the applicability of these descriptions for collisionless plasmas, the link between plasma heterogeneity and the PDF of magnetic field intensity in the solar wind. They also include numerical simulations of three-dimensional Hall-MHD turbulence (attempting in particular to understand the abrupt change of slope in the power law magnetic energy spectrum at the ion gyroscale), of the formation of small-scale structures able to trigger dissipative processes and of the interplay between turbulence and micro-processes such as reconnection. Extensions to satellite data of statistical methods often used for the analysis of wind-tunnel turbulence are also discussed. Observational and theoretical progresses on electrostatic solitary waves in environments such as the solar wind, the magnetosphere, the plasma-sheet boundary layer, the auroral regions, or the ionosphere are presented. Furthermore, astrophysical turbulence in accretion disks and observational constraints on its role in the heating of the solar corona are addressed.

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Special Issue Editors

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