Foreword

Today, we are asked to meet the heavy demand of our society for the technological innovations to conserve the environment and energy, and to improve the safety systems of engineering structures. The novel technique is required to prevent the failure or fracture accidents of engineering systems in service. Experimental mechanics play an important role in these technological innovations. In recent years, experimental mechanics have made a remarkable progress in the measurement and analysis of the stress, strain, deformation, fracture and fatigue of a variety of engineering structures ranging from large-sized to micro-nano-sized structures.

The International Conference on Advanced Technology in Experimental Mechanics 2003 (ATEM '03) was held from September 10 to 12, 2003, in Nagoya, Japan, as one of the international activities of The Materials & Mechanics Division of The Japan Society of Mechanical Engineers (MMD-JSME). At the Conference, over 310 papers were presented to more than 400 participants from 20 countries. All aspects of the advanced technology in experimental mechanics from basic researches to industrial applications were covered. Together with the general session, the following twelve specific sessions on the subjects of current interests were organized: 1) Full-Field Optical Methods, 2) Nondestructive Testing and Evaluation of Material Properties, 3) Thermal Methods and Techniques, 4) X-Ray, Synchrotron and Neutron Diffraction Methods and Residual Stress Analysis, 5) Nano-Scale Observation and Analysis, 6) Characterization of Materials for MEMS/MST Devices, 7) Testing and Evaluation of Living Tissues and Biomaterials, 8) Material Design and Evaluation for Synergy Ceramics with the Hyper-Organized Structures, 9) Composite Structures —Damage Detection and Smart Monitoring, 10) Mechanical Behavior of Lead/Lead Free Solders, 11) Fatigue Damage Characterization and Modeling, 12) Assessment of Structural Integrity.

This special issue consists of two reviews and twenty-two papers which are selected from the Conference contributions and accepted to the special issue. The selection of papers was conducted by several organizers of the above twelve sessions, and all the submitted articles were peer reviewed by plural referees in accordance with the JSME International Journal review system.

I believe these twenty-four articles provide us with the latest developments of the advanced technology in experimental mechanics and will become mileposts for future progress of the field. Finally, I would like to express my sincere gratitude to the organizers of ATEM '03 and the reviewers of the papers. And I offer my special thanks to my colleagues, Professor Y. Akiniwa and Dr. H. Kimura, for their devotion to ATEM '03 and their assistance in editing this special issue.

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