



H. U. Walter (Editor)

Fluid Sciences and Materials Science in Space A European Perspective

With 384 Figures

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Preface

The peaceful use of space flight systems for research and technological developments in the context of promoting European and international cooperation represents the essential motivation for the programmes of the European Space Agency (ESA). One of ESA's programmes is dedicated to microgravity research, which is now an established discipline in Europe, with a dedicated group of scientists participating. The Challenger disaster has resulted in a serious discontinuity of flight opportunities in the next few years but the forthcoming International Space Station, new launchers and reentry vehicles are expected to provide ample opportunities for microgravity research in the long term. Meanwhile parabolic aircraft flights, sounding rockets as well as the delayed Shuttle-dependent missions, Spacelab D-2, the IML-missions and EURECA I, will be employed to keep microgravity experimenters reasonably busy in the interim period.

To prepare the ground for these activities, both regarding research and experiment facilities, an in-depth analysis of the state of the art is an essential requirement at this time. Such an analysis is presented in this volume. It addresses all of the topics that have been identified to be of relevance. Besides a presentation of the fundamental aspects justifying microgravity research, the results of experiments already performed are reviewed and recommendations for future activities are made. Close to fifty European scientists have cooperated in the preparation of this volume and their dedicated and concerted effort is greatly appreciated.

This volume clearly demonstrates that this new branch of experimental physics merits the attention of the scientific community at large. The potential scientific and technological benefits are substantial and commercial endeavours may become viable. The latter aspect however needs to be approached with deliberation and realism, and the last chapter of this monograph puts the matter in a proper perspective. Materials are of paramount importance in high technology systems and they are, therefore, one of the key elements in ensuring the competitiveness of industrialized nations. It is mandatory for Europe to find its place in this endeavour and to follow a consistent policy.

ESA, with the full support of its member states, is presently preparing a long-term plan for its microgravity programme, "In Orbit 2000". It will address the scientific programme, programmatic aspects and hardware developments. The evolution of microgravity research will, however, depend on the active involvement of high level scientists and engineers and their continuous, painstaking efforts. Space-based science is a costly activity requiring a complex infrastructure and microgravity research is certainly no exception. It is

therefore of the utmost importance that experiments are well prepared with the support of adequate ground-based activities.

I consider this volume a milestone in the evolution of fully worthwhile European Space Station utilization and microgravity research programmes.

Ph. Goldsmith

Director,

Earth Observation and Microgravity

EUROPEAN SPACE AGENCY

Paris, June 1987

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