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FOR MATHEMATICS IN INDUSTRY



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Progress in Industrial Mathematics at ECMI 2000

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Preface

Realizing the need of interaction between universities and research groups in industry, the European Consortium for Mathematics in Industry (ECMI) was founded in 1986 by mathematicians from ten European universities. Since then it has been continuously extending and now it involves about all European countries.

The aims of ECMI are

- To promote the use of mathematical models in industry.
- To educate industrial mathematicians to meet the growing demand for such experts.
- To operate on a European Scale.

Mathematics, as the language of the sciences, has always played an important role in technology, and now is applied also to a variety of problems in commerce and the environment.

European industry is increasingly becoming dependent on high technology and the need for mathematical expertise in both research and development can only grow.

These new demands on mathematics have stimulated academic interest in Industrial Mathematics and many mathematical groups world-wide are committed to interaction with industry as part of their research activities.

ECMI was founded with the intention of offering its collective knowledge and expertise to European Industry.

The experience of ECMI members is that similar technical problems are encountered by different companies in different countries. It is also true that the same mathematical expertise may often be used in differing industrial applications.

Efficient problem solving very often requires the use of recent research results in different mathematical fields, yet no single applied mathematician is able to cover the whole subject. By providing a European research network ECMI can bring in experts from a wide geographical range. When a "real-world" problem has been formulated in mathematical terms using expert advice, then it must be developed to the stage of producing computer output which can "illuminate" the original problem via efficient methods of scientific computing and visualization.

Helmut Neunzert in his "Alan Tayler Lecture" provides an illuminating excursion across the thoughts of one of the inspiring founders of ECMI. Biannual ECMI CONFERENCES are an important and integrating part of ECMI's activities. They ensure timely distribution of ideas and thoughts and provide for fora where "supply and demand" can meet. In view of its special role ECMI conferences focus on applications rather on mathematical

subjects. In the same conference special meetings are organized where the problem themes are central and not the methodology as such. After the first founding conference in Amsterdam in 1985 this on this one is the eleventh.

Most of the special sessions have been built around the activities of the ECMI Special Interest Groups. They are in fact application oriented, to provide a networking system for discussions in workshops, joint research activity, wherever a single European country would be often small. They play the role of interface on specific topics of interest for industry, providing advice and assistance in particular with respect to mathematical modelling of problems.

I wish to remark that interfacing mathematics and real world is not at all new in history.

Tracing back to the roots of hellenistic mathematics, Euclid provided via its axiomatization of geometry a way to abstract mathematics from specific applications, thus letting it move towards other many and diversified applications; the message that we can restate is that it is just its capability of abstraction of structures and methods that make Mathematics transversal to all human activities. This is the main reason for which the ECMI Council adopted Sicily as the site of the ECMI 2000 conference. The year 2000 was dedicated by UNESCO to Mathematics and in this way we have been participating to joining the future millennium to the Greek roots of Mathematics.

Sicily (the core of Magna Grecia) played a fundamental role in bridging the hellenistic world and the modern western world also via the golden age of Frederick the II and later of the Arab civilization.

As usual this volume is based on contributions to the conference but could not collect all the proceedings for obvious reasons of space and timeliness.

As President of ECMI, I wish to thank here on behalf of the whole ECMI Council all those that have contributed to the success of the Conference. Among these the participants, the speakers, the International Scientific Committee, all the local organizers and in particular the chairman, Prof Antonio Greco and his collaborators. Special mention is deserved to the scientific staff of the Conference including Dr Alessandra Micheletti from the University of Milano, Dr Daniela Morale from the University of Torino and Dr Luciano Seta from the University of Palermo. Special thanks are due to Dr Daniela Morale and Dr Giacomo Aletti for the coordination of the production of the volume and Springer-Verlag for its publication.

Milano, June 2001

Vincenzo Capasso, President of ECMI

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