
Foreword

Experiments and computational approaches are of great importance in all scientific and engineering disciplines. To enable continued progress and further development, more work on experimental methods and computational procedures is needed.

Scientific and technological developments were in ancient times mainly based on observations of natural occurrences. Later on, basically during the last five hundred years or so, theoretical analysis using powerful mathematical principles started to occur, culminating in the progress made during the first half of the last century. These resulted in the emergence of numerical methods that nowadays permeate all ranges of science and technology. At the same time, experimental techniques underwent remarkable improvements, becoming more sophisticated and refined, while liable to handle accurately and reliably large amounts of data. It can be seen that because of their increasing improvements, experimental techniques are becoming more and more multifaceted and complex so that both the operation of the apparatus as well as the collection of the data can only be achieved with the assistance of computers. The huge amount of data obtained needs to be processed by means of computational methods.

Accurate experimental tests are more important than ever because of the increasing sophistication of numerical schemes developed for highly non-linear problems. The reliability of experimental data in these cases is vital for the validation of those schemes and to inspire confidence in the experimental data. Numerical methods play an increasingly important role in experiments, not only to process and interpret the data, but also to assist in the design of a programme to reduce the number of tests, for instance.

The combined use of a computer simulated experiment aimed at the identification of system parameters through an optimisation procedure is a major development which emerged due to the dramatic evolution of computer hardware and simulation software codes. Computer simulation can indeed provide powerful insight into the behaviour of systems and processes as well as many other scientific and engineering problems. The use of simulation software for instance has led to the emergence of “virtual prototyping” which is widely used in the manufacturing industry to reduce expensive and time-consuming hardware models.

Nowadays, even the evolution of some parameters can be followed up; the experiment itself continuously analysing the measurements obtained. This allows the monitoring of different types of components and gives useful information about preventative maintenance of complex systems.

The main objective of the International Journal of Computational Methods and Experimental Measurements is to provide a forum to the scientific and engineering communities for the presentation and discussion of the interaction and complementary factors of Computational Methods and Experiments, with emphasis on their reciprocal and mutually beneficial integration. The Journal will also focus on the following areas:

- a) Experimental measurement techniques which have gradually become very sophisticated
- b) Computer software, able to simulate very complex behaviour
- c) Optimization procedures applied to the interaction between experimental and numerical data

The Journal has evolved from a series of very successful initiatives taken by the Wessex Institute of Technology over the last 30 years or so, which include several major conferences; including one with the same title as the Journal and others on materials, structural and mechanical systems. Most of the papers submitted at those meetings can be seen in WIT's eLibrary (<http://library.witpress.com>). The Journal attempts to provide room for further development of these ideas in a more comprehensive way.

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