Preface

Superconvergence and A Posteriori Error Estimates in Finite Element Methods

In recent years, there has been a renewed interest in the superconvergence phenomenon of the finite element method. This is mostly contributed to the need of *a posteriori* error estimates in adaptive methods. It has been found that superconvergence is a key to constructing asymptotically exact recovery type error estimators. Nevertheless, recovery error estimators based on averaging behave remarkably well even without the presence of superconvergence.

Except for one article by Babuška and Oden, this special issue contains the second part of selected and referee reviewed articles presented at a recent international conference held at Hunan Normal University (Changsha, China) from May 31 to June 2 of 2004 on *Superconvergence and A Posteriori Error Estimates in Finite Element Methods*. The objective of the conference was to bring together experts in superconvergence and *a posteriori* error estimates to discuss recent developments and future directions in the field. Topics of discussion included superconvergence in the finite element method and its application, *a posteriori* error estimates, post-processing, adaptively, and relevant problems.

This is actually the third international conference/workshop in a row devoted to the superconvergence phenomenon in the finite element method. The first one was at the University of Jyväskylä, Finland in 1996, and the second was at the Mathematical Science Research Institute (MSRI), University of California at Berkeley in 2000.

During the conference a special social program was organized for participants, including a reception, a get-together party, a concert, a conference banquet, and a tour to the Ma-Wang-Dui Tomb of the Han-Dynasty. After the conference, there was a visit to Zhang-Jia-Jie, a National Forest Park of China well-known for its picturesque scenery.

About forty researchers from seven different countries, including China, the Czech Republic, Germany, the Netherlands, Sweden, the United Kingdom, and the United States, attended the conference. We would like to thank Ivo Babuška and Vidar Thomée for their agreement to serve as honorary chairs of the conference. In addition, we would like to thank the Scientific Committee members: Mark Ainsworth, Carsten Carstensen, Michal Krizek, Stig Larsson, Yanping Lin, Qun Lin, Wenbin Liu, Lars B. Wahlbin, and Jinchao Xu, for their expertise and assistance.

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We would also like to thank Professor Yanping Lin, the Editor-in-Chief of the *International Journal of Numerical analysis and Modeling* (IJNAM), for the opportunity to publish selected papers at the conference as special issues of IJNAM. More than thirty talks were given at the conference. Of the many papers submitted, the selected issue contains those that have successfully gone through the rigorous review process for publishing in IJNAM.

Finally, we wish to thank all authors for their spirited efforts and contributions, and the reviewers who worked hard to ensure the high quality of this special issue of IJNAM.

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About the managing editor of this special issue

Dr. Zhimin Zhang, Professor of Mathematics at Wayne State University (USA), and Distinguished Guest Professor at Hunan Normal University (China), received his Ph.D. in applied mathematics from University of Maryland at College Park in 1991. He was Assistant Professor and Associate Professor at Texas Tech University from 1991 to 1999. His research interests are numerical solutions for partial differential equations, computational mechanics, and scientific computing. His research has been continuously funded by the US National Science Foundation since 1996.