Dedicated to Professor Francisco J. Lisbona on the occasion of his 65th birthday

Preface

The construction, analysis and application of numerical methods to solve ordinary and partial differential equations are among the main research fields in today's scientific computing and they are of great interest in applied mathematics. This special issue is composed from research works on fundamental theoretical results as well as applications of advanced numerical techniques for Partial Differential Equations showing their efficiency, reliability and robustness. The selected papers included in this special issue were presented at the workshop "Numerical Methods for Ordinary and Partial Differential Equations and Applications" held from 3^{rd} to 5^{th} of September of 2012 at the University of Zaragoza (Spain) and dedicated to the 65^{th} birthday of Professor Francisco J. Lisbona. This workshop gathered close collaborators and friends of Professor Lisbona, junior researchers that he has mentored during his professional career and many of his students.

The scientific program included contributed talks by many invited speakers, who presented recent results in areas where Professor Lisbona has been among the main forces advancing the research. More than fifty participants from France, Russia, Ireland, the Netherlands, Germany, USA, Israel, and, of course, Spain contributed to the workshop success. The diversity of the presentations and the papers included in this special issue show the broad research interests of Professor Lisbona and provide an overview of many of the research topics in which he has had visible impact. We would like to thank everyone involved in the publication process of this IJNAM volume and especially to both the authors and the referees for their hard work, understanding, and cooperation. We also wish to thank the sponsors of the conference: the Spanish Government (via project MTM2011-15298-E), the University of Zaragoza and the Instituto Universitario de Matemáticas y Aplicaciones of University of Zaragoza. Thanks also go to the members of the Scientific Committee, to all the attendees for their participation in the conference, and to the research group Numerical Methods for Partial Differential and Integral Equations for providing excellent organization of the event.

On behalf of all the contributors, we dedicate this volume to our teacher, friend and colleague Francisco J. Lisbona.

We are greatly pleased to introduce this collection of papers in honor of Francisco Lisbona, Professor at the Department of Applied Mathematics of the University of Zaragoza. Francisco Lisbona is an applied mathematician who has extensively contributed to the field of numerical solution of ordinary and partial differential equations and scientific computing. He has authored or coauthored more than 90 scientific publications in renowned international journals in numerical analysis and its applications by bridging solid mathematical theory, scientific computing, and applications in sciences and engineering.

Francisco Lisbona was born in Zaragoza, on December 15^{th}, 1947 He graduated as a top student in his class from Cardenal Xavierre High School in Zaragoza. He demonstrated his talent for mathematics and his dedication to study it, and in 1965 he was admitted in the University of Zaragoza to continue his studies. He graduated with degree in Mathematics in 1970 and during the first two years after graduation he combined teaching in high school with research in the Astronomy Department of the University of Zaragoza. After that, in 1972, Francisco moved to the University of Bilbao where studied and worked towards obtaining his PhD degree under the supervision of Professor Mariano Gasca. His PhD thesis work was in approximation theory, and during this time Francisco was also teaching at the University of Bilbao.

After receiving his PhD degree in 1976, which was awarded with *Distinction*, Francisco Lisbona worked at the University of Bilbao for a year and during this time he received one of the first national faculty positions in numerical analysis in Spain. This position allowed him to move back University of Zaragoza, Department of Differential Equations, which was led by Professor Rodriguez Vidal. Upon his arrival, he was put in charge of developing the numerical analysis program at this department, a discipline which was then making its first steps in Spain.

At this time, in collaboration with Manuel Calvo, Lisbona started his work on the numerical integration of initial value problems (IVP) for ordinary differential equations (ODEs). In the late seventies, he visited during the Department of Applied Mathematics of the Université de Rennes (France) for one year. This visit had notable impact on his future as scientist, since the focus of his research shifted to numerical methods for partial differential equations, and it remains his primary field of research to this day. In Rennes he met Professor Michel Crouzeix and at the beginning they started working on numerical methods for IVP, in particular in the analysis of the stability of multistep methods with variable step and order. During this visit, driven by his scientific curiosity, Professor Lisbona also invested time in studying the analytical aspects of numerical methods for partial differential equations and more specifically, the finite element methods. He became well versed in these modern numerical techniques and upon returning to University of Zaragoza he was put in charge of the group in numerical analysis for partial differential equations. In the mean time, Professor Rodriguez Vidal retired and Professor Lisbona was promoted to full professor, a position which he holds now.

One specific topic which caught Lisbona's interest was the numerical approximation of singularly perturbed problems and this became one of the main research lines that he and his group have followed since then. During the following years his professional career was also connected with the Université de Pau et des Pays de L'Adour (France). He had the fortune to spend some months there, and he met a number of scientists working in finite element methods for partial differential equations. One of them was Professor Jean-Marie Thomas, with whom Lisbona established a good research and personal relationship. Also there, he started to work