PREFACE

I am happy to present this special issue on ***Computational Mechanics*** of Proceedings of the Indian National Science Academy. This issue contains a few selected papers presented by the plenary, keynote and invited speakers at the Sixth International Congress on Computational Mechanics and Simulation (ICCMS2016) held at the Indian Institute of Technology Bombay (IIT Bombay) on 27 June-1 July 2016 under the aegis of the Indian Association for Computational Mechanics (IndACM). It will be appropriate for me to describe here the history of both IndACM and ICCMS.

The most powerful and appealing numerical method for the solution of real life problems in mechanics though was developed in 1956 (Turner *et al*., 1956) but the name finite element method (FEM) was coined by Professor Ray Clough of University of California at Berkeley in the year 1960 (Clough, 1960). This discretization technique could attain its full potential because of the simultaneous and continuous developments in modern digital computers. Professor OC Zienkiewicz, who was a practitioner of finite difference technique until then saw a future in this new method and started a serious school in FEM at the University of Wales in Swansea in the United Kingdom. I got an opportunity to work in Swansea as a Visitor under the auspices of 1979 Jawaharlal Nehru Memorial Trust (UK) Fellowship during 1979-1982.

By then Swansea was known for its contributions in the FEM. The department of civil engineering, which Professor Zienkiewicz headed, used to organize conferences at regular intervals on a theme related to FEM and such meetings used to attract eminent researchers and academicians from around the world.

One such key event was the International Conference on Numerical Methods for Coupled Problems held in September 1981 to felicitate Professor OC Zienkiewicz on his 60th birth anniversary. Almost all the big names in the field of FEM including Professors RW Clough, JH Argyris, RH Gallagher, JT Oden, RL Taylor, TJR Hughes and many others were present. An idea of formation of International Association for Computational Mechanics (IACM) was mooted by Professor Gallagher, a close friend of Professor Zienkiewicz, through circulation of a half page write-up. I was struck by the simplicity of this whole operation.

The idea of organizing such conferences and scientific meetings in our own country for the benefit of young researchers did occur to me. It was basically to bring together all those involved in the theory and practice of FEM and other associated numerical methods under one roof on a common platform. On return from the United Kingdom to IIT Bombay in October 1982 this idea continued ringing in my mind. I got an opportunity to participate in SMiRT83 (International Conference on Structural Mechanics in Reactor Technology) at Chicago in August 1983. Before leaving for the conference, I got about 500 brochures printed announcing FEICOM85 (International Conference on Finite Elements in Computational Mechanics) to be held at IIT Bombay in December 1985. This happened on the spur of the moment and without any preplanning. In SMiRT83, I met a lot of active academicians and made friends including the one lifelong friendship with Professor Ajaya Gupta of North Carolina State University. He was instrumental in fixing my technical visits to several universities after Chicago meeting. I could visit and give seminar talks at the University of Illinois at Urbana-Champaign, Washington University in Saint Louis, the University of Arizona at Tucson, Illinois Institute of Technology in Chicago, North Carolina State University in Raleigh and Durham University. It was a very enriching experience for me. Wherever I went I also left some brochures of FEICOM85 and gave personal invitations. FEICOM85 was a very successful conference with a total participation of about 300 including around 75 delegates from outside the country. Some of the big names in FEM then including Professors Oden, Belytschko, Baker, Davis, Atluri, Batra, Reddy, Chandra Desai and Ajaya Gupta participated. The above events gave me a lot of exposure and confidence and I developed a good number of friends in my area of research both within

and outside the country. I enjoy and cherish this lifelong friendship even today.

It took several years for Professor Gallagher and his close friends around the world to formalize the idea of IACM and they could organize the first World Congress on Computational Mechanics (WCCM) at the University of Texas at Austin only in 1987 under the umbrella of IACM. I started thinking about such a group in our own country. There were several people in our country who were extremely good in numerical computations, solid and fluid mechanics, thermodynamics, etc. The basic idea behind my thinking was to strengthen good and credible research in the country. It was also to encourage young researchers and those pursuing their PhDs in the area of computational mechanics which encompasses most of the disciplines in physical science and engineering. I wish to emphasize very emphatically that research in engineering was a new phenomenon in our country in the late sixties and early seventies. It started slowly at the Indian Institute of Science (IISc) Bengaluru because of their great legacy in science. There is no doubt that the general research scenario in engineering and technology in the country was strengthened by the establishment of the Indian Institutes of Technology (IITs) and the start of the Quality Improvement Program (QIP) for the teachers by the Government of India. It is also true that good research can only be produced in a conducive environment. IITs also could not contribute much to research in the beginning because most of the faculty were involved in the physical development of the Institutes' infrastructure.

The idea of formation of Indian Association for Computational Mechanics (IndACM) originated from the FEICOM85 meeting. However, it could only be formed on the 1st of January 2000 on the eve of SEC2000 (Second Structural Engineering Convention) at IIT Bombay. I wrote an email about the idea of IndACM to my friends and colleagues within the country on the night of 31st December 1999 and 1st January 2000. I received an overwhelming response and over a dozen people from academia and research organizations joined the Association as founder members and thus began the journey of IndACM. I was fortunate to have my close colleague, Professor Yogesh Desai, with me associated with the Association right from day one. Very soon we started thinking about bringing the membership of IndACM on a platform in the form of congress of members and this gave birth to ICCMS (International Congress on Computational Mechanics and Simulation) under the umbrella of IndACM. Professors Ashwini Kumar and NGR Iyengar of IIT Kanpur came forward to hold the first congress ICCMS2004 on 9-12 December 2004 at IIT Kanpur. Friends started coming forward to hold the next congress and thus subsequent congresses have been held in 2006 (IIT Guwahati, 8-10 December), 2009 (IIT Bombay, 1-3 December), 2012 (IIT Hyderabad, 10-12 December) and 2014 (SERC Madras, 10-13 December) and the present, the 6th ICCMS2016 in IIT Bombay on 27 June-1 July 2016. Faculty members of two institutes, IITB and VJTI are involved in the organization of ICCMS2016 under the joint leadership of Professors Yogesh Desai and Abhay Bambole. This ends the story of IndACM and ICCMS from my side as on today.

ICCMS tries to maintain a high standard of technical content and quality of presentation and it attracts a large number of budding researchers from various institutes besides attracting the sizable number of well-established researchers in the field both from within and outside the country. It is proposed that abstracts of all the presentations will be put online and will be linked to this special volume of the proceedings. I am deeply indebted to the Editor-in-Chief Professor Subhash Chandra Lakhotia for his encouragement, help and support and the editorial team of the INSA for their untiring efforts in bringing out this issue of the proceedings in such a short time.

References

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