



Instituto nacional de pesquisas espaciais

*Advances in Space Dynamics 4 - Celestial Mechanics and Astronautics*

## **Advances in Space Dynamics 4 Celestial Mechanics and Astronautics**

Edited by:  
Hélio Koiti Kuga

**Instituto Nacional de Pesquisas Espaciais  
São José dos Campos - 2004**

**ADVANCES IN  
SPACE DYNAMICS 4:**

**CELESTIAL MECHANICS  
AND  
ASTRONAUTICS**

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## **Foreword**

The *XI Colóquio Brasileiro de Dinâmica Orbital* (XI Brazilian Colloquium on Orbital Dynamics) was successfully held in Viçosa, Minas Gerais state of Brazil. It was hosted by Federal University of Viçosa, from 04 to 08 of November, 2002. The organizing committee was chaired by *Ricardo Reis Cordeiro* (UFV - Federal University of Viçosa) and the following members: *Daniela Lazzaro* (ON - National Observatory), *Hélio Koiti Kuga* (INPE - Brazilian Institute for Space Research), *Sandro da Silva Fernandes* (ITA - Technological Institute of Aeronautics), *Silvia Maria Giuliatti Winter* (UNESP - State University of São Paulo), *Tatiana A. Michtchenko* (IAG - Astronomical and Geophysical Institute), and *Cristian Beauge* (National University of Cordoba). Major sponsors were Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP), Fundação de Amparo à Pesquisa do Estado do Rio de Janeiro (FAPERJ), Fundação de Amparo à Pesquisa do Estado de Minas Gerais (FAPEMIG), Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), and Fundação Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES).

This biannual event provides the specialists working in the area a forum for sharing their experiences and discussing the ideas on past, present, and future researches. The Colloquium featured the state of art, on-going researches, technological issues, trends, and new developments. As far as the Orbital Dynamics is concerned, the selected papers for this book try to highlight the accomplishments of the Brazilian community and South American partners.

We also forward our thanks to Valdemir Carrara for drawing the cover (Mars with Earth and Moon on background), Vivian Martins Gomes and Leandro Baroni for the help with the manuscripts, all the reviewers and authors who contributed to this book, and Fundação Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) which sponsored this issue.

**Hélio Koiti Kuga**

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