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June 19-21, 1974

Editor G.E.O. Giacaglia



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## Preface

This volume includes original papers presented at the 4th Symposium on Satellite Dynamics held at the XII Annual Plenary Meeting of COSPAR. At a time where it might be thought that very few problems were left unsolved in celestial mechanics, we discover that new and more challenging questions must be answered. The precision of observations reaches the centimeter level and physical phenomena which had been disregarded come into play. We need a better treatment of atmospheric drag, radiation forces, and a better knowledge of the earth's gravitational field. Time has to be precisely defined as well as reference systems, including improved values for precision and nutation. The question of resonances introduced by nonzonal harmonics was to be carefully investigated. Numerical integration techniques must be optimized and means of controlling their errors improved. Analytical techniques must be made appropriate for computer processing. Presently existing methods of solutions of differential equations of interest to celestial mechanics are getting cumbersome as all these new facts come to light. It is clear that entirely new and more effective methods are necessary. These methods must, among other requirements, take into account the essential nonlinear character of the equations. Finally, the motion about the center of mass of a satellite is becoming an essential need for the thorough understanding and description of the orbital motion.

Several of the above questions are reviewed and discussed in this volume and represent all important additions to the reference literature of scholars and students in celestial mechanics.

We are grateful to COSPAR, IAU and IUTAM for their support and express our deepest appreciation to the São Paulo State Research Foundation (FAPESP) who has provided substantial financial support for travel and maintenance expenses of the invited lecturers.

São Paulo, June 1974

Giorgio E. O. Giacaglia

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