TABLE OF CONTENTS

PREFACE VII

LIST OF PRINCIPAL SPEAKERS IX

LIST OF PARTICIPANTS XI

I. REGULARIZATION

E. STIEFEL / A Linear Theory of the Perturbed Two-Body Problem (Regularization) 3

J. WALDVOGEL / Collision Singularities in Gravitational Problems 21

D. C. HEGGIE / Regularization Using a Time-Transformation Only 34

J. BAUMGARTE / Stabilization of the Differential Equations of Keplerian Motion 38

F. NAHON / The Particular Solutions of Levi-Civita 45

O. GODART / Example of Integration of Strongly Oscillating Systems 53

W. BLACK / The Application of Recurrence Relations to Special Perturbation Methods 61

D. G. BETTIS / Numerical Solution of Ordinary Differential Equations (*Abstract*) 71

II. THE THREE-BODY PROBLEM

V. SZEBEHELY / Recent Advances in the Problem of Three Bodies 75

R. F. ARENSTORF / Periodic Elliptic Motion in the Problem of Three Bodies (*Abstract*) 107

G. KATSIARIS and C. L. GOUDAS / On a Conjecture by Poincaré 109

G. KATSIARIS / The Three-Dimensional Elliptic Problem 118

P. G. KAZANTZIS / Second and Third Order Variations of the Three Dimensional Restricted Problem 135

C. G. ZAGOURAS / Planar Periodic Orbits Using Second and Third Variations 146

E. RABE / Elliptic Restricted Problem: Fourth-Order Stability Analysis of the Triangular Points 156

P. GUILLAUME / A Linear Description of the Second Species Solutions 161

III. THE *N*-BODY PROBLEM AND STELLAR DYNAMICS

G. CONTOPOULOS / Problems of Stellar Dynamics 177

W. T. KYNER / Invariant Manifolds in Celestial Mechanics 192

S. J. AARSETH / Theoretical Aspects of *N*-Body Computer Simulations 197

S. J. AARSETH / Integration Methods of the *N*-Body Problem (*Abstract*) 208

R. WIELEN / Numerical Studies of the Gravitational Problem of *N*-Bodies (*Abstract*) 209
J. R. DORMAND / Star Encounter Simulations 211
O. GODART / Yukawa Potential and Stellar Encounter 216
C. AUST / An Investigation of the Rôle of Turbulence in the Formation of Star Clusters by a Point-Mass Simulation 222

IV. THE THEORY OF GENERAL PERTURBATIONS

G. HORI / Theory of General Perturbations 231
J. HENRARD / The Algorithm of the Inverse for Lie Transform 250
U. KIRCHGRABER / The Property of Covariance in Hori's Non-Canonical Perturbation Theory (*Abstract*) 260
J. RAE / Subdynamics in Classical Mechanics 262

V. THE SOLAR SYSTEM AND ORBITAL RESONANCES

G. A. WILKINS / Astronomical Systems of Units, Co-ordinates and Time-Scales 273
R. L. DUNCOMBE / Masses of the Planets and Satellites (*Abstract*) 287
R. L. DUNCOMBE / Planetary Ephemerides 289
P. J. MESSAGE / Orbits of the Natural Satellites. Lectures on Some Types of Orbital Motion Amongst Them 309
G. COLOMBO and F. A. FRANKLIN / On the Origin of the Titan-Hyperion System 312
M. W. OVENDEN / Planetary Distances and the Missing Planet 319
R. R. ALLAN / Change of Inclination in Passing Through Resonance 333

VI. TRAJECTORY DETERMINATION AND THE MOTION OF RIGID BODIES

M. S. DAVIS / Review of Non-Numerical Uses of Computers 351
P. HERGET / Elementary Dynamical Astronomy 392
B. D. TAPLEY / Statistical Orbit Determination Theory 396
M. SCHNEIDER / Orbit Determination by Solving a Boundary Value Problem 426
J. E. COCHRAN / Long-Term Motion in a Restricted Problem of Rotational Motion 429
M. VITINS / Uniform Theory of a Rotating Rigid Body with Dynamical Symmetry 454
W. J. ROBINSON / Attitude Stability of a Satellite in the Restricted Three-Body Problem 457
B. L. STANEK / Analytic Treatment of Straight-Line Flights into the Sun after Planetary Fly-By 461