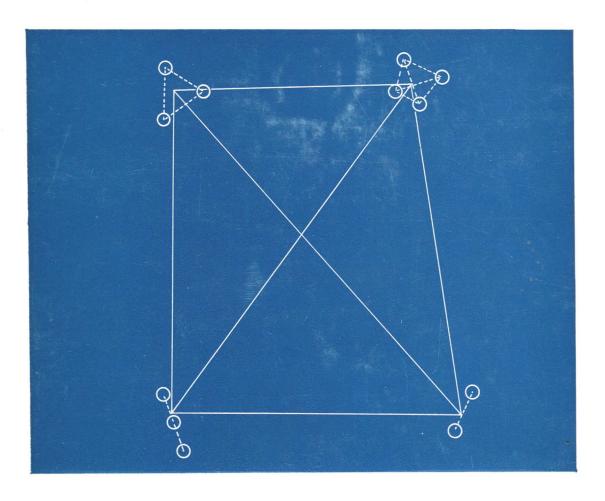
## THE STABILITY OF THE SOLAR SYSTEM AND OF SMALL STELLAR SYSTEMS

Edited by Y. KOZAI





INTERNATIONAL ASTRONOMICAL UNION D. REIDEL PUBLISHING COMPANY

 $\frac{1}{\text{DORDRECHT-HOLLAND}/BOSTON-U.S.A.} \\ \text{https://doi.org/10.1017/S0074180900070728} \text{ Published online by Cambridge University Press} \\$ 

SYMPOSIUM No. 59
STELLAR INSTABILITY
AND EVOLUTION

SYMPOSIUM No. 60

GALACTIC

RADIO ASTRONOMY

SYMPOSIUM No. 61

NEW PROBLEMS IN

ASTROMETRY

SYMPOSIUM No. 63

CONFRONTATION OF

COSMOLOGICAL

THEORIES WITH

OBSERVATIONAL DATA

SYMPOSIUM No. 64
GRAVITATIONAL
RADIATION
AND GRAVITATIONAL
COLLAPSE

SYMPOSIUM No. 65

EXPLORATION OF THE PLANETARY SYSTEM

SYMPOSIUM No. 66

LATE STAGES OF

STELLAR EVOLUTION

D. REIDEL PUBLISHING COMPANY DORDRECHT-HOLLAND / BOSTON-U.S.A.

## THE STABILITY OF THE SOLAR SYSTEM AND OF SMALL STELLAR SYSTEMS

## INTERNATIONAL ASTRONOMICAL UNIÓN UNION ASTRONOMIQUE INTERNATIONALE

#### SYMPOSIUM No. 62

(COPERNICUS SYMPOSIUM I)

HELD AT WARSAW, POLAND, SEPTEMBER 5-8, 1973

# THE STABILITY OF THE SOLAR SYSTEM AND OF SMALL STELLAR SYSTEMS

EDITED BY

Y. KOZAI

Tokyo Astronomical Observatory, Mitaka, Tokyo, Japan



D. REIDEL PUBLISHING COMPANY dordrecht-holland/boston-u.s.a.

1974

## Published on behalf of the International Astronomical Union and the International Union of Theoretical and Applied Mechanics by D. Reidel Publishing Company, P.O. Box 17, Dordrecht, Holland

All Rights Reserved

Copyright © 1974 by the International Astronomical Union

Sold and distributed in the U.S.A., Canada, and Mexico by D. Reidel Publishing Company, Inc. 306 Dartmouth Street, Boston, Mass. 02116, U.S.A.

Library of Congress Catalog Card Number 74–76475 Cloth edition: ISBN 90 277 0458 9 Paperback edition: ISBN 90 277 0459 7

No part of this book may be reproduced in any form, by print, photoprint, microfilm, or any other means, without written permission from the publisher

Printed in The Netherlands by D. Reidel, Dordrecht

#### TABLE OF CONTENTS

PREFACE	VII
J. MOSER / Stability Theory in Celestial Mechanics	1
L. MARKUS / Modern Dynamical Systems Theory	11
H. POLLARD / The Present State of the n-Body Problem	19
M. LECAR / Bode's Law	21
H. JEHLE / Distribution of the Mean Motions of Planets and Satellites and the	
Development of the Solar System	23
J. M. BARNOTHY / Can the Solar System be Quantized?	25
M. LECAR and F. A. FRANKLIN / On the Original Distribution of the Asteroids	37
S. F. DERMOTT / The Origin of Commensurabilities in the Satellite Systems	57
s. GASKA / The Origin of the Asteroid Ring	59
G. A. CHEBOTAREV, N. A. BELYAEV, and R. P. EREMENKO / Orbits of Tro-	•
jan Asteroids	63
R. GREENBERG / The Role of Saturn's Oblateness in the Mimas-Tethys	05
Resonance	71
H. SCHOLL and R. GIFFEN / Stability of Asteroidal Motion in the Hecuba	, -
Gap	77
Y. KOZAI and M. YUASA / Secular Perturbations for Asteroids Belonging to	• •
Families	81
A. BRAHIC / The Formation of Disks by Inelastic Collisions of Gravitating	0.
Particles. Applications to the Dynamics of the Saturn's Ring and to the	
Formation of the Solar System	83
G. A. KRASINSKY / Stationary Solutions of the Averaged Three-Body Problem	03
and Some Problems of Planet Motion Stability	95
M. L. LIDOV / Integrable Cases of Satellite Problem with the Third Body and	93
the Oblate Planet	117
	117
B. GARFINKEL / The Global Solution in the Problem of the Critical Inclination	125
D. BENEST / Retrograde Satellites in the Circular Plane Restricted Three-Body	120
Problem	129
v. MATAS / A Note on a Separation of Equations of Variation of the Elliptic	
Restricted Three-Body Problem into Hill's Equations	131
N. A. BELYAEV and S. D. SHAPOREV / Comet Schwassmann-Wachmann 3	100
(1930 VI)	133
L. M. BELOUS / The Motion of Comet Westphal in 1852–1974	135
N. A. BOKHAN and Yu. A. CHERNETENKO / The Motion of Comet Encke-Backlund over 1901–1970	137

V. A. BRUMBERG / An Iterative Method of General Planetary Theory	139
N. I. LOBKOVA and M. S. PETROVSKAYA / On the Calculation of Secular	
Perturbations in the Case of Close Commensurability	157
P. BRETAGNON / Long Period Terms in the Solar System	165
S. FERRAZ-MELLO / On the Theory of the Galilean Satellites of Jupiter	167
J. S. GRIFFITH / Conditions for Escape and Retention	185
G. I. EROSHKIN / Influence of the Dynamical Figure of the Moon on Its	
Rotational-Translational Motion	201
A. H. JUPP / A Comparison of the Mean-Value and Initial-Value Solutions of	
the Ideal Resonance Problem with an Application in Rigid-Body Mechanics	209
M. J VALTONEN / Statistics of Three-Body Experiments	211
D. C. HEGGIE / The Role of Binaries in Cluster Dynamics	225
L. O. LODÉN and H. RICKMAN / On the Stability of Small Clusters or Cluster	
Remnants	231
C. ALLEN and A. POVEDA / The Dynamical Evolution of Trapezium Systems	239
T. A. AGEKJAN and J. P. ANOSOVA / The Stability of Triple Stellar Systems	247
L. LOSCO / Sur un invariant intégral du problème des n corps: Conséquence de	
l'homogénéité du potentiel	249
G. JANIN and M. J. HAGGERTY / Numerical Experiments on Expanding	
Gravitational Systems	257
M. HÉNON / Numerical Experiments on the Stability of Spherical Stellar	
Systems	259
R. H. MILLER / On the 'Thermodynamics' of Self-Gravitating N-Body Systems	261
D. G. SAARI / Dynamics and Clusters of Galaxies	273
A. S. BARANOV and Yu. V. BATRAKOV / Dynamical Friction Effects on the	
Motion of Stars in Rotating Spherical Clusters	285
C. FROESCHLÉ and J. P. SCHEIDECKER / On the Disappearance of Isolating	
Integrals in Dynamical Systems with More than Two Degrees of Freedom	297
SUBJECT INDEX	311