

Lecture Notes in Physics

Edited by J. Ehlers, München, K. Hepp, Zürich and
H. A. Weidenmüller, Heidelberg
Managing Editor: W. Beiglböck, Heidelberg

21

Optimization and Stability Problems in Continuum Mechanics

Lectures Presented at the Symposium on Optimization
and Stability Problems in Continuum Mechanics
Los Angeles, California, August 24, 1971

Edited by P. K. C. Wang
University of California, Los Angeles, CA/USA



Springer-Verlag
Berlin · Heidelberg · New York 1973

ISBN 3-540-06214-9 Springer-Verlag Berlin · Heidelberg · New York
ISBN 0-387-06214-9 Springer-Verlag New York · Heidelberg · Berlin

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically those of translation, reprinting, re-use of illustrations, broadcasting, reproduction by photocopying machine or similar means, and storage in data banks.

Under § 54 of the German Copyright Law where copies are made for other than the amount of the fee to be determined by agreement with the publisher.

© by Springer Verlag Berlin · Heidelberg 1973. Library of Congress Catalog Card Number 73-78080. Printed in Germany.

Offsetprinting and bookbinding: Julius Beltz, Hemsbach/Bergstr.

CONTENTS

PART 1. OPTIMIZATION PROBLEMS

- H.Halkin: The Method of Dubovitskii-Milyutin in Mathematical
Programming 1
- R.T.Shield: Optimum Design of Structures Through Variational
Principles 13
- T.Y.Wu ,A.T.Chwang and P.K.C.Wang: Optimization Problems in
Hydrofoil Propulsion 38

PART 2. STABILITY PROBLEMS

- E.F.Infante: Stability Theory for General Dynamical Systems
and Some Applications 63
- E.M.Barston: Stability of Dissipative Systems with Applications
to Fluids and Magnetofluids 83

PREFACE

The five papers in this volume represent expanded versions of the lectures presented at the Symposium on Optimization and Stability Problems in Continuum Mechanics at the University of Southern California, Los Angeles, August 24, 1971. The Symposium was held in conjunction with the Western Applied Mechanics Conference sponsored by the Applied Mechanics Division of the American Society of Mechanical Engineers with the cooperation of the University of Southern California.

The objectives of this Symposium were twofold, namely, to introduce recent results in general optimization and stability theories which have potential applications to continuum mechanical systems and to present new results dealing with specific classes of systems. It is felt that there is a wealth of new and interesting optimization and stability problems in continuum mechanics. Hopefully, these lectures will help to stimulate further research in this relatively new area.

The idea for this Symposium was originally conceived by Professor C.S.Hsu of the University of California, Berkeley, who also presided over the Stability Session of this Symposium. Professor G.H.Hegemier of the University of California, San Diego, served as the Co-Chairman of this Symposium.

Los Angeles, California
April, 1972

P.K.C.Wang