SYSTEMATIC ERRORS IN ENGINEERING EXPERIMENTS

By the same author

A Background to Engineering Design

SYSTEMATIC ERRORS IN ENGINEERING EXPERIMENTS

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First published 1978 by
THE MACMILLAN PRESS LTD
London and Basingstoke
Associated companies in Delhi Dublin
Hong Kong Johannesburg Lagos Melbourne
New York Singapore and Tokyo

British Library Cataloguing in Publication Data

Polak, Peter

Systematic errors in engineering
experiments.

1. Engineering - Experiments

2. Errors, Theory of

I. Title

620'.007'24 TA152

ISBN 978-1-349-04218-0 ISBN 978-1-349-04216-6 (eBook)

DOI 10.1007/978-1-349-04216-6

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PREFACE

This book is intended for students of mechanical, chemical and other branches of engineering at universities or technical colleges. It should help them to benefit from laboratory work by encouraging a thoughtful, critical attitude and by indicating the wider context of basic experiments. This type of material is difficult to present and even more difficult to absorb when given in lecture form; it is hoped that lecturers as well as students will welcome this selection. It is complementary to the well-established books on instrumentation, with a minimum of overlap.

The sequence has been arranged to suit students throughout their tertiary education, starting with material which can be followed on the basis of school-work, following on to those topics met early on in an engineering course. The later parts include material appropriate to project and research work. Detailed descriptions have been avoided, except in the case of gas analysis, in view of the limitations of space and the great variety of apparatus available for most of the other operations.

ACKNOWLEDGMENTS

The author is very grateful to Dr K. Martin of UWIST for his constructive criticism of the manuscript and to the University of Sheffield for the use of general facilities. Particular thanks are due to Mrs P. Windle, for typing and presentation, and Messrs Hallford and Francis for help with photographic work.

SYMBOLS

E = Young's Modulus

ν = Poisson's Ratio

$E' = E/(1 - \nu^2)$

P = load (chapter 3)

N = normal contact force (chapters 3 and 7); otherwise newtons

μ = coefficient of friction (chapters 3 and 7)

θ = end slope (chapter 3)

σ = (tensile) stress (chapter 4)

k = concentration factor for stress or strain (chapter 4)

C_d = coefficient of discharge = actual flow $\div$ theoretical flow at maximum measured or calculated velocity

Re_D = Reynolds number based on large (approach pipe) diameter
= velocity $\times$ diameter $\div$ kinematic viscosity

Re_d = ditto based on smallest (throat) diameter

g = acceleration due to Earth's gravity

Y = yield point (appendix 1)