THEORY

OF

DIFFERENTIAL EQUATIONS.

THEORY

OF

DIFFERENTIAL EQUATIONS.

PART I.

EXACT EQUATIONS AND PFAFF'S PROBLEM.

BY

ANDREW RUSSELL FORSYTH, Sc.D., F.R.S.,

FELLOW OF TRINITY COLLEGE, CAMBRIDGE.

CAMBRIDGE:
AT THE UNIVERSITY PRESS.
1890

CAMBRIDGE UNIVERSITY PRESS
Cambridge, New York, Melbourne, Madrid, Cape Town,
Singapore, São Paulo, Delhi, Tokyo, Mexico City

Cambridge University Press
The Edinburgh Building, Cambridge CB2 8RU, UK

Published in the United States of America by
Cambridge University Press, New York

www.cambridge.org
Information on this title: www.cambridge.org/9781107650244

First published 1890
First paperback edition 2011

A catalogue record for this publication is available from the British Library

ISBN 978-1-107-65024-4 Paperback

PREFACE.

THE present volume is the first contribution towards the fulfilment of a promise made at the time of publication of my *Treatise on Differential Equations*. My desire has been to include every substantial contribution to the development of the particular subject herein dealt with; and the historical form, into which the treatment has been cast, has facilitated the indication of the continuous course of the development.

All sources of information, which have been drawn upon, are quoted in their proper connection; a few investigations have been added, which I believe to be new; and some examples have been made, in order to provide illustrations of various methods.

In the revision of the proof-sheets I have had, and wish to acknowledge most gratefully, the valuable assistance of my friend Mr. H. M. Taylor, Fellow of Trinity College, Cambridge. The volume owes much to the care and trouble he has ungrudgingly bestowed upon it. My thanks are also due to Mr. H. F. Baker, Fellow of St. John's College, Cambridge, for his kindness in reading the proof-sheets.

A. R. FORSYTH.

TRINITY COLLEGE, CAMBRIDGE,
28 *July*, 1890.

CONTENTS.

CHAPTER I.

SINGLE EXACT EQUATION.

CHAPTER II.

SYSTEM OF EXACT EQUATIONS.

CHAPTER III.

HISTORICAL SUMMARY OF METHODS OF TREATING PFAFF'S PROBLEM.

CHAPTER IV.

PFAFF'S REDUCTION, COMPLETED AS BY GAUSS AND JACOBI.

CHAPTER V.

GRASSMANN'S METHOD.

CHAPTER VI.

NATANI'S METHOD.

CHAPTER VII.

APPLICATION TO PARTIAL DIFFERENTIAL EQUATIONS OF THE FIRST ORDER.

CHAPTER VIII.

CLEBSCH'S METHOD.

CHAPTER IX.

TANGENTIAL TRANSFORMATIONS.

CHAPTER X.

LIE'S METHOD.