



Differential Equations: Their Solution Using Symmetries

By Hans Stephani

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In many branches of physics, mathematics, and engineering, solving a problem means solving a set of ordinary or partial differential equations. Nearly all methods of constructing closed form solutions rely on symmetries. The emphasis in this text is on how to find and use the symmetries; this is supported by many examples and more than 100 exercises. This book will form an introduction accessible to beginning graduate students in physics, applied mathematics, and engineering. Advanced graduate students and researchers in these disciplines will find the book a valuable reference.



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Editorial Review

Review

"...as an account of classical general relativity, this well produced and excellently translated book has many virtues." Physics Bulletin

"A nice introduction to the theory and practice of finding and using symmetries to solve differential equations." American Mathematical Monthly

"...Stephani's book does a good job of motivating the study of Lie group methods for differential equations from an elementary standpoint." SIAM Reviews

"The author, who has an easy-to-read practical style, consistently keeps the emphasis on applications. Thus, most physicists will be able to get useful information about ordinary differential equations (ODE's) and partial differential equations (PDE's), without being bogged down in cumbersome mathematical formalism....well worth reading if one is at all interested in sophisticated and powerful symmetry techniques for handling differential equations and if one wishes to have the most straightforward approach to the topic." D. E. Vincent, Physics in Canada

"...Stephani...has built a book that tries to guide its readers toward a sure knowledge of this very important tool for finding solutions of (nonlinear) differential equations. In the early sections, the derivations presented are the most clear and detailed ones that this writer has ever seen....Students new to this area will find reading or studying the current book an altogether enjoyable occupation, without any of the intimidation that sometimes is caused by similar books." J.D. Finley, Foundations of Physics

From the Back Cover

This book provides an introduction to the application of the solution of differential equations using symmetries, a technique of great value in mathematics and the physical science.

About the Author

Hans Stephani gained his diploma, Ph.D. and Habilitation at the Friedrich-Schiller-Universitat Jena. He became Professor of Theoretical Physics in 1992, before retiring in 2000. He has been lecturing in theoretical physics since 1964 and has published numerous papers and articles on relativity and optics. He is also the author of four books.

Malcolm MacCallum is Professor of Applied Mathematics at the School of Mathematical Sciences, Queen Mary, University of London, where he is also Vice-Principal for Science and Engineering. He graduated from King's College, Cambridge and went on to complete his M.A. and Ph.D. there. His research covers general relativity and computer algebra, especially tensor manipulators and differential equations. He has published over 100 pages, review articles and books.

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