Numerical Models for Differential Problems (MS&A)

By Alfio Quarteroni

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In this text, we introduce the basic concepts for the numerical modelling of partial differential equations. We consider the classical elliptic, parabolic and hyperbolic linear equations, but also the diffusion, transport, and Navier-Stokes equations, as well as equations representing conservation laws, saddle-point problems and optimal control problems. Furthermore, we provide numerous physical examples which underline such equations. In particular, we discuss the algorithmic and computer implementation aspects and provide a number of easy-to-use programs.

The text does not require any previous advanced mathematical knowledge of partial differential equations: the absolutely essential concepts are reported in a preliminary chapter. It is therefore suitable for students of bachelor and master courses in scientific disciplines, and recommendable to those researchers in the academic and extra-academic domain who want to approach this interesting branch of applied mathematics.

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Review
From the reviews: "This book contains the basic concepts for the approximation of differential equations which arise in the mathematical modeling of real life applications. … it can be used as a textbook for graduate-level courses. Moreover, the interested reader can find a lot of information on the various aspects of the numerical approximation of differential problems, so that it can also be used as a starting point for the study of more specific topics in this field." (Lucia Gastaldi, Mathematical Reviews, Issue 2010 h)

From the Back Cover

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In particular, we discuss the algorithmic and computer implementation aspects and provide a number of easy-to-use programs.

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About the Author

The Author is Professor and Director of the Chair of Modelling and Scientific Computing (CMCS) at the Institute of Analysis and Scientific Computing of EPFL, Lausanne (Switzerland), since 1998, Professor of Numerical Analysis at the Politecnico di Milano (Italy) since 1989, and Scientific Director of MOX, since 2002. Author of 22 books published with Springer, and of about 200 papers published in refereed international Journals, Conference Proceedings and Magazines, Alfio Quarteroni is actually one of the strongest and reliable mathematicians in the world in the field of Modelling and SC.

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