Industrial mathematics: a course in solving real-world problems

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Abstrak

Are Calculus and "post" Calculus (such as differential equations) playing an important role in research and development done in industry? Are these mathematical tools indispensable for improving industrial products such as automobiles, airplanes, televisions, and cameras? Do they play a role in understanding air pollution, predicting weather and stock market trends, and building better computers and communication systems? This book was written to convince the reader, by examples, that the answers to all the above questions is yes!

Industrial Mathematics is a fast growing field within the mathematical sciences. It is characterized by the origin of the problems which it engages; they all come from industry: Research and Development, finances, and communications. The common feature running through this enterprise is the goal of gaining a better understanding of industrial models and processes through mathematical ideas and computations. The authors of this book have undertaken the approach of presenting real industrial problems and their mathematical modeling as a motivation for developing mathematical methods that are needed for solving the problems. With each chapter presenting one important problem that arises in today's industry, and then studying the problem by mathematical analysis and computation, this book introduces the reader to many new ideas and methods from ordinary and partial differential equations, and from integral equations and control theory. It brings the excitement of real industrial problems into the undergraduate mathematical curriculum.

The problems selected are accessible to students who have already taken what in many colleges and universities constitutes the first two-year basic Calculus sequence. A working knowledge of Fortran, Pascal, or C language is required.