An Invitation to Applied Mathematics: Differential Equations, Modeling, and Computation

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An Invitation to Applied Mathematics: Differential Equations, Modeling, and Computation introduces the reader to the methodology of modern applied mathematics in modeling, analysis, and scientific computing with emphasis on the use of ordinary and partial differential equations. Each topic is introduced with an attractive physical problem, where a mathematical model is constructed using physical and constitutive laws arising from the conservation of mass, conservation of momentum, or Maxwell's electrodynamics.

Relevant mathematical analysis (which might employ vector calculus, Fourier series, nonlinear ODEs, bifurcation theory, perturbation theory, potential theory, control theory, or probability theory) or scientific computing (which might include Newton's method, the method of lines, finite differences, finite elements, finite volumes, boundary elements, projection methods, smoothed particle hydrodynamics, or Lagrangian methods) is developed in context and used to make physically significant predictions. The target audience is advanced undergraduates (who have at least a working knowledge of vector calculus and linear ordinary differential equations) or beginning graduate students.

Readers will gain a solid and exciting introduction to modeling, mathematical analysis, and computation that provides the key ideas and skills needed to enter the wider world of modern applied mathematics.

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- Provides practical and comprehensible introductions to complex subjects, for example, conservation laws, CFD, SPH, BEM, and FEM
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