

error analysis, regression, and common geoscience multivariate techniques such as empirical orthogonal function analysis, time series, and objective-mapping methods. The data-analysis coverage is a valuable and novel aspect of the book because the techniques considered are generally not found in modeling texts even though they are essential tools for relating models to data and observations.

The next five chapters present a whirlwind tour of numerical techniques for solving ordinary and partial differential equations. Most of the material is standard, but two chapters stand out: One contains an excellent tutorial on how to build computational models from scratch, including many strategies that modelers use daily, and another describes how to optimize models and assess results. Both topics are often neglected in textbooks.

In the remaining seven chapters, the authors highlight various illustrative models used in marine science—for example, a sediment diagenesis model and one- and two-dimensional upper-ocean models. The authors make the models accessible to a broad audience by explaining the rationale and background for each, and they provide detailed Matlab code in each case. Their

examples, based on published models, could easily be adapted for classes in environmental physics or engineering. Two chapters give brief introductions to more advanced topics: 3D general circulation models, inverse models, and data-assimilation techniques. The final chapter, on scientific visualization, offers some good advice on presenting the results of models and simulations.

In their goal to write a text that is accessible to students with a wide range of backgrounds, the authors have succeeded. However, achieving that goal has produced both strengths and some minor weaknesses. The book's impressive breadth sometimes comes at the expense of depth; an annotated list of further reading at the end of each chapter would have been a useful addition. The authors motivate, rather than rigorously derive, the chosen methods and formulas. That is a reasonable choice, given the intended audience, but the crucial assumptions are not always made clear for the reader. Therefore, course instructors will have to provide supplementary material.

Students will find that the included Matlab code is an excellent resource, showing them how to translate the mathematical problem into a computational one. However, the authors' style

of programming is somewhat idiosyncratic. For example, consecutively run scripts are generally used instead of functions. That style may be easier for novice programmers to come to grips with, but it is better that students learn good programming habits early. Lastly, the book's informal, conversational style may not appeal to all readers.

Despite its minor weaknesses, *Modeling Methods for Marine Science* is an accessible introduction to modeling and thus fills a serious gap in the literature. The detailed examples are an excellent resource for students and teachers, and the book should justifiably become a standard text in the personal libraries of aspiring and established researchers interested in modeling marine and environmental systems.

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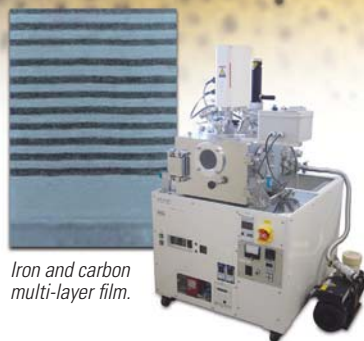


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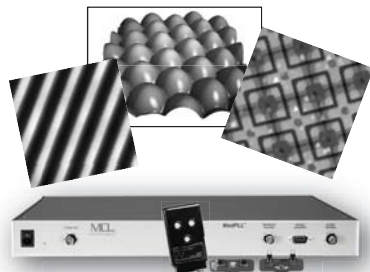
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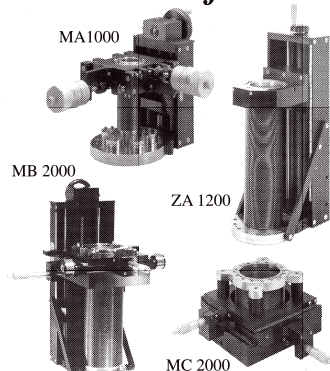


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