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REVIEWS AND DESCRIPTIONS OF TABLES AND BOOKS

The numbers in brackets are assigned according to the American Mathematical Society classification scheme. The 2000 Mathematics Subject Classification can be found in print starting with the 1999 annual index of *Mathematical Reviews*. The classifications are also accessible from `www.ams.org/msc/`.

2[65M06, 65N06]—*The immersed interface method. Numerical solutions of PDEs involving interfaces and irregular domains*, by Zhilin Li and Kazufumi Ito, SIAM, Philadelphia, PA, 2006, 332 + xvi pp., softcover, US$85.00, member US$59.50, ISBN 0-89871-609-8

This book summarizes the authors' research, in particular, focusing on the sharp discretizations of interface problems pioneered by Randall LeVeque and Zhilin Li with their 1994 paper. The book is extremely well written (almost surprisingly so), and an important contribution to the field of numerical analysis. I would recommend this book as a must read for any graduate student in numerical analysis (at least the first few chapters), as the book carefully covers the basic numerical discretization of nonsmooth functions. Since theoretical results often revolve around functions that are sufficiently smooth, it is not surprising that Charlie Peskin's immersed boundary method has been so popular and successful for over 30 years. The immersed boundary method aims to numerically smooth out problematic functions, which works well for a vast number of problems and is typically quite simple to implement. In contrast, the immersed interface method rolls up its sleeves and gets its hands dirty, carefully Taylor expanding in presence of discontinuities with no extra or added smoothing. All of this extra work results in higher order accuracy, as well as convergence in the L_∞ norm (often elusive for an immersed boundary discretization). It is important that numerical analysts fully understand and explore both options, and this text nicely illustrates the sharp discretization of nonsmooth functions. The main weakness of the text is that it does not spend enough time discussing and comparing the sharp methods to their smoothed out immersed boundary counterparts. The strengths and weaknesses of each method depend on the problem at hand, as well as the goals of the numerical simulation. Adding this to a second edition would give the text greater appeal to a larger audience. In that vein, the text could also spend more time discussing other related sharp interface discretizations, for example XFEM and the work of Ted Belytchko, Frederic Gibou's fourth order accurate sharp interface method, etc. Nonetheless, the authors have done a fine job making this technique accessible to the community.

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