A Shock-Fitting Primer (Chapman & Hall/CRC Applied Mathematics & Nonlinear Science)

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A defining feature of nonlinear hyperbolic equations is the occurrence of shock waves. While the popular shock-capturing methods are easy to implement, shock-fitting techniques provide the most accurate results. **A Shock-Fitting Primer** presents the proper numerical treatment of shock waves and other discontinuities.

The book begins by recounting the events that lead to our understanding of the theory of shock waves and the early developments related to their computation. After presenting the main shock-fitting ideas in the context of a simple scalar equation, the author applies Colombeau's theory of generalized functions to the Euler equations to demonstrate how the theory recovers well-known results and to provide an in-depth understanding of the nature of jump conditions. He then extends the shock-fitting concepts previously discussed to the one-dimensional and quasi-one-dimensional Euler equations as well as two-dimensional flows. The final chapter explores existing and future developments in shock-fitting methods within the framework of unstructured grid methods.

Throughout the text, the techniques developed are illustrated with numerous examples of varying complexity. On the accompanying CD-ROM, MATLAB® codes serve as concrete examples of how to implement the ideas discussed in the book.

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