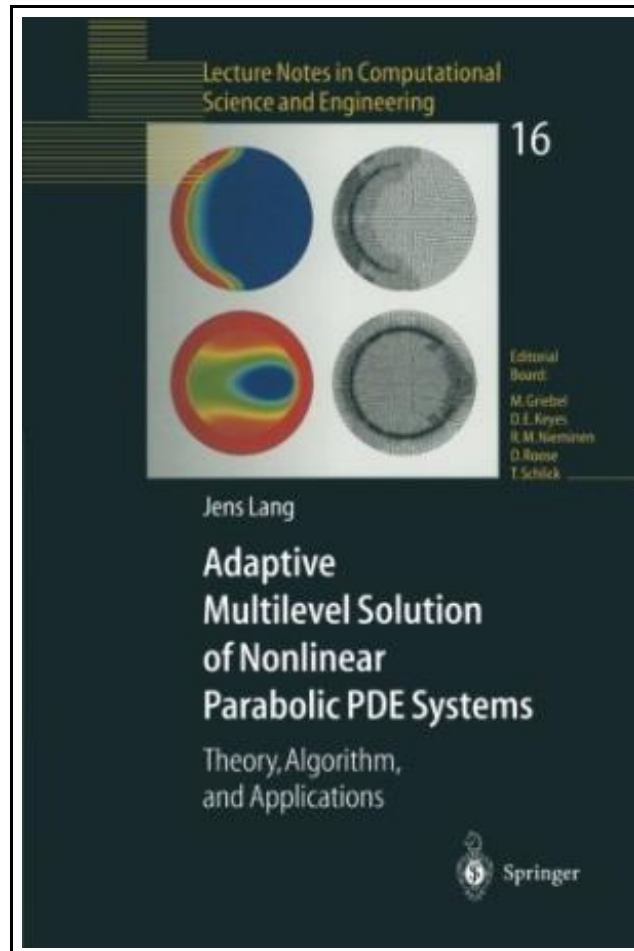


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Book Condition: New. Publisher/Verlag: Springer, Berlin | Theory, Algorithm, and Applications | Nowadays there is an increasing emphasis on all aspects of adaptively generating a grid that evolves with the solution of a PDE. Another challenge is to develop efficient higher-order one-step integration methods which can handle very stiff equations and which allow us to accommodate a spatial grid in each time step without any specific difficulties. In this monograph a combination of both error-controlled grid refinement and one-step methods of Rosenbrock-type is presented. It is my intention to impart the beauty and complexity found in the theoretical investigation of the adaptive algorithm proposed here, in its realization and in solving non-trivial complex problems. I hope that this method will find many more interesting applications. Berlin-Dahlem, May 2000 Jens Lang Acknowledgements I have looked forward to writing this section since it is a pleasure for me to thank all friends who made this work possible and provided valuable input. I would like to express my gratitude to Peter Deuflhard for giving me the opportunity to work in the field of Scientific Computing. I have benefited immensely from his help to get the right perspectives, and from his continuous encouragement and support over several years. He certainly will forgive me the use of Rosenbrock methods rather than extrapolation methods to integrate in time. | I Introduction.- II The Continuous Problem and Its Discretization in Time.- III Convergence of the Discretization in Time and Space.- IV Computational Error Estimation.- V Towards an Effective Algorithm. Practical Issues.- VI Illustrative Numerical Tests.- VII Applications from Computational Sciences.- Appendix A. Advanced Tools from Functional Analysis.-1. Gelfand Triple.-2. Sesquilinear Forms and Bounded Operators in Hilbert Spaces.-3. Unbounded Operators in Hilbert Spaces.-4. Analytic Semigroups.-5. Vectorial Functions Defined on Real Intervals.- Appendix B. Consistency and...



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