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**Sinopsis**

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This monograph is the first to provide a comprehensive, self-contained and rigorous presentation of some of the most powerful preconditioning methods for solving finite element equations in a common block-matrix factorization framework.

Topics covered include the classical incomplete block-factorization preconditioners and the most efficient methods such as the multigrid, algebraic multigrid, and domain decomposition. Additionally, the author discusses preconditioning of saddle-point, nonsymmetric and indefinite problems, as well as preconditioning of certain nonlinear and quadratic constrained minimization problems that typically arise in contact mechanics. The book presents analytical as well as algorithmic aspects.

This text can serve as an indispensable reference for researchers, graduate students, and practitioners. It can also be used as a supplementary text for a topics course in preconditioning and/or multigrid methods at the graduate level.