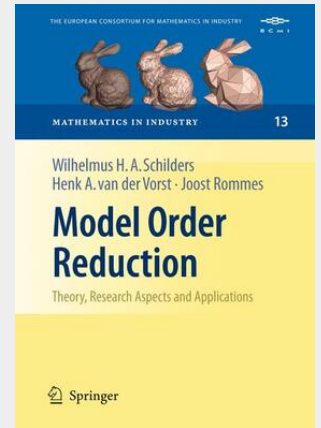Schilders / Rommes / van der Vorst

Model Order Reduction: Theory, Research Aspects and Applications

The idea for this book originated during the workshop "Model order reduction, coupled problems and optimization" held at the Lorentz Center in Leiden from S- tember 19–23, 2005. During one of the discussion sessions, it became clear that a book describing the state of the art in model order reduction, starting from the very basics and containing an overview of all relevant techniques, would be of great use for students, young researchers starting in the ?eld, and experienced researchers. The observation that most of the theory on model order reduction is scattered over many good papers, making it dif?cult to ?nd a good starting point, was supported by most of the participants. Moreover, most of the speakers at the workshop were willing to contribute to the book that is now in front of you. The goal of this book, as de?ned during the discussion sessions at the workshop, is three-fold: ?rst, it should describe the basics of model order reduction. Second, both general and more specialized model order reduction techniques for linear and nonlinear systems should be covered, including the use of several related numerical techniques. Third, the use of model order reduction techniques in practical appli- tions and current research aspects should be discussed. We have organized the book according to these goals. In Part I, the rationale behind model order reduction is explained, and an overview of the most common methods is described.

The goal of this book is three-fold: it describes the basics of model order reduction and related aspects. In numerical linear algebra, it covers both general and more specialized model order reduction techniques for linear and nonlinear systems, and it discusses the use of model order reduction techniques in a variety of practical applications. The book contains many recent advances in model order reduction, and presents several open problems for which techniques are still in development. It will serve as a source of inspiration for its readers, who will discover that model order reduction is a very exciting and lively field.

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