Finite Difference Methods on Irregular Networks

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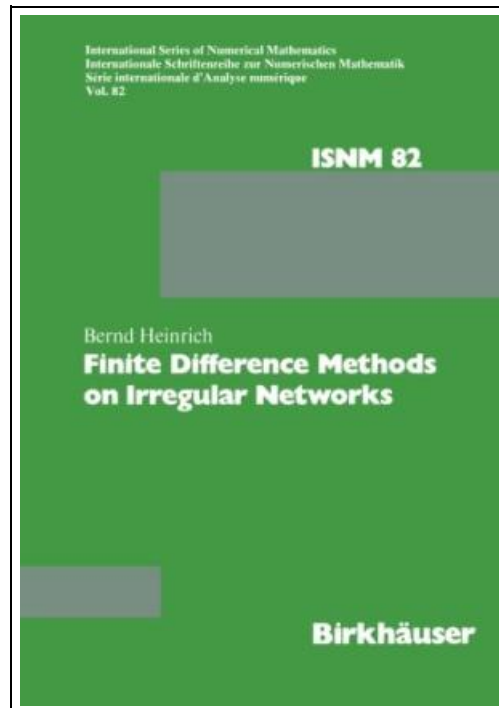Vol. 82

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Bernd Heinrich

**Finite Difference Methods
on Irregular Networks**

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This publication is fantastic. It really is full of knowledge and wisdom You are going to like just how the author write this publication.
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Book Condition: New. Publisher/Verlag: Springer, Basel | The finite difference and finite element methods are powerful tools for the approximate solution of differential equations governing diverse physical phenomena, and there is extensive literature on these discre tization methods. In the last two decades, some extensions of the finite difference method to irregular networks have been described and applied to solving boundary value problems in science and engineering. For instance, "box integration methods" have been widely used in electro nics. There are several papers on this topic, but a comprehensive study of these methods does not seem to have been attempted. The purpose of this book is to provide a systematic treatment of a generalized finite difference method on irregular networks for solving numerically elliptic boundary value problems. Thus, several disadvan tages of the classical finite difference method can be removed, irregular networks of triangles known from the finite element method can be applied, and advantageous properties of the finite difference approxima tions will be obtained. The book is written for advanced undergraduates and graduates in the area of numerical analysis as well as for mathematically inclined workers in engineering and science. In preparing the material for this book, the author has greatly benefited from discussions and collaboration with many colleagues who are concerned with finite difference or (and) finite element methods. | 1. Introduction.- 1.1. Preliminary remarks.- 1.2. Scope of monograph.- 1.3. Plan of monograph, comments.- 2. Boundary Value Problems and Irregular Networks.- 2.1. A class of elliptic problems.- 2.2. Irregular networks.- 2.2.1. Networks of triangles and rectangles.- 2.2.2. Locally irregular networks.- 2.3. Secondary networks and boxes.- 2.3.1. General remarks.- 2.3.2. Secondary networks via the perpendicular bisectors (PB).- 2.3.3. Secondary networks via the medians (MD).- 3. Construction of Finite Difference Approximations.- 3.1. The principle of approximation.- 3.2. Finite difference schemes...

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