Explosive Instabilities in Mechanics

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Book Condition: New. Publisher/Verlag: Springer, Berlin | This book deals with explosive instabilities in mechanics, deriving a solution to a system of PDEs that arise in practical situations. It begins with a relatively simple account of blow-up in systems of interaction-diffusion equations. Among the topics presented are: classical fluid equations, catastrophic behavior in nonlinear fluid theories, blow-up in Volterra equations, and rapid energy growth in parallel flows. | 1. Introduction.- 1.1 Blow-Up in Partial Differential Equations in Applied Mathematics.- 1.2 Methods of Establishing Non-existence and Growth Solutions.- 1.2.1 The Concavity Method.- 1.2.2 The Eigenfunction Method.- 1.2.3 Explicit Inequality Methods.- 1.2.4 The Multi-Eigenfunction Method.- 1.2.5 Logarithmic Convexity.- 1.3 Finite Time Blow-Up Systems with Convection.- 1.3.1 Fujita-Type Problems.- 1.3.2 Equations with Gradient Terms.- 1.3.3 Systems with Gradient Terms.- 1.3.4 Equations with Gradient Terms and Non-Dirichlet Boundary Conditions.- 1.3.5 Blow-Up of Derivatives.- 2. Analysis of a First-Order System.- 2.1 Conditional Decay of Solutions.- 2.2 Boundedness of Solutions.- 2.3 Unconditional Decay of Solutions.- 2.3.1 Special Cases.- 2.4 Global Non-existence of Solutions.- 2.5 Numerical Results by Finite Elements.- 2.5.1 Solution Structure with Linear and Quadratic Right-Hand Sides.- 3. Singularities for Classical Fluid Equations.- 3.1 Breakdown for First-Order Systems.- 3.2 Blow-Up of Solutions to the Euler...

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