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Nota di contenuto	ch. 1. Newtonian filtration equations. 1.1. Introduction. 1.2. Existence and uniqueness of solutions: One dimensional case. 1.3. Existence and uniqueness of solutions: Higher dimensional case. 1.4. Regularity of solutions: One Dimensional case. 1.5. Regularity of solutions: Higher dimensional case. 1.6. Properties of the free boundary: One dimensional case. 1.7. Properties of the free boundary: Higher dimensional case. 1.8. Initial trace of solutions. 1.9. Other problems -- ch. 2. Non-Newtonian filtration equations. 2.1. Introduction. Preliminary knowledge. 2.2. Existence of solutions. 2.3. Harnack inequality and the initial trace of solutions. 2.4. Regularity of solutions. 2.5. Uniqueness of solutions. 2.6. Properties of the free boundary. 2.7. Other problems -- ch. 3. General quasilinear equations of second order. 3.1. Introduction. 3.2. Weakly degenerate equations in one dimension. 3.3. Weakly Degenerate equations in higher dimension. 3.4. Strongly degenerate equations in one dimension. 3.5. Degenerate equations in higher dimension without terms of lower order. 3.6. General strongly degenerate equations in higher dimension -- ch. 4. Nonlinear diffusion equations of higher order. 4.1. Introduction. 4.2. Similarity solutions of a fourth order equation. 4.3. Equations with

double-degeneracy. 4.4. Cahn-Hilliard equation with constant mobility. 4.5. Cahn-Hilliard equations with positive concentration dependent mobility. 4.6. Thin film equation. 4.7. Cahn-Hilliard equation with degenerate mobility.

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## Sommario/riassunto

Nonlinear diffusion equations, an important class of parabolic equations, come from a variety of diffusion phenomena which appear widely in nature. They are suggested as mathematical models of physical problems in many fields, such as filtration, phase transition, biochemistry and dynamics of biological groups. In many cases, the equations possess degeneracy or singularity. The appearance of degeneracy or singularity makes the study more involved and challenging. Many new ideas and methods have been developed to overcome the special difficulties caused by the degeneracy and singularity, which enrich the theory of partial differential equations. This book provides a comprehensive presentation of the basic problems, main results and typical methods for nonlinear diffusion equations with degeneracy. Some results for equations with singularity are touched upon.

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