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Harnack's Inequality for Degenerate and Singular Parabolic Equations

While degenerate and singular parabolic equations have been researched extensively for the last 25 years, the Harnack inequality for nonnegative solutions to these equations has received relatively little attention. Recent progress has been made on the Harnack inequality to the point that the theory is now reasonably complete—except for the singular subcritical range—both for the p-Laplacian and the porous medium equations.

This monograph provides a comprehensive overview of the subject that highlights open problems. The authors treat the Harnack inequality for nonnegative solutions to p-Laplace and porous medium type equations, both in the degenerate and in the singular range. The work is mathematical in nature; its aim is to introduce a novel set of tools and techniques that deepen our understanding of the notions of degeneracy and singularity in partial differential equations.

Although related in spirit to a monograph by the first author in this subject, this book is a self-contained treatment with a different perspective. Here the focus is entirely on the Harnack estimates and on their applications; the authors use the Harnack inequality to reprove a number of known regularity results. This book is aimed at researchers and advanced graduate students who work in this fascinating field.

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