

# $p$ -Laplacian — applications of the theory to mathematical models

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We will apply maximum and comparison principles to problems from turbulent filtration of natural gas in porous rock and groundwater filtration in gravel. In particular, we will focus on a model of turbulent filtration of natural gas in a porous rock due to Leibenson. We will discuss connections between our recent results and the classical results obtained by Barenblatt in 1950<sup>3</sup> for this equation. In the case of mathematical models of turbulent filtration of water in gravel, we will mainly focus on an example of filtration flow between two drainage channels. Our maximum principles have also some implication on the choice of suitable numerical methods for these problems.