



A Sub-Supersolution Approach for Singular Quasilinear Neumann Systems with Gradient Dependence

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Abstract

The main purpose of this contribution is to establish existence and regularity results for singular quasilinear Neumann elliptic systems involving gradient terms. These systems incorporate nonlinear terms depending on the solution, its gradient, and spatial variables. This dependence leads to a complex interplay of phenomena driven by reaction, absorption, and convection processes, which are key components in mathematical models describing various nonlinear processes in engineering and natural systems.

Our approach relies on a sub-supersolution technique specifically developed for Neumann systems featuring gradient terms and singularities. Furthermore, we provide precise control on solutions and their gradients, along with their localization.

Keywords: p -Laplacian, singular systems, Neumann boundary condition, sub-supersolution, fixed point.

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