Research

Analysis Seminar

Quasilinear systems with gradient terms arising in viscous, heat-conducting flows

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Abstract. We deal with the following quasilinear elliptic system involving gradient terms in the form:

$$\begin{cases} \Delta_p u = v^m |\nabla u|^\alpha & \text{in} \quad \Omega \\ \Delta_p v = v^\beta |\nabla u|^q & \text{in} \quad \Omega, \end{cases}$$

where $\Omega \subset \mathbb{R}^N (N \geq 2)$ is either equal to $\mathbb{R}^N$ or equal to a ball B_R centered at the origin and having radius $R > 0$, $1 < p < \infty$, $m, q > 0$, $\alpha \geq 0$, $0 \leq \beta \leq m$ and $\delta := (p-1-\alpha)(p-1-\beta) - qm \neq 0$. Our aim is to establish the asymptotics of the

1. global radial solutions (so behaviour at infinity)
2. blowing-up radial solutions (so profile of the blow up)

For that we use the theory of dynamical cooperative systems. Uniqueness results follow for both types of solutions from the proved accurate asymptotics and a hidden maximum principle, [1], [2].

References

[1] M. Ghergu, J. Giacomoni and G. Singh, *Global and Blow-up radial solutions for quasilinear ellitic systems arising in the study of viscous heat conducting fluids*, Nonlinearity, 2020.

[2] A. Bachir, J. Giacomoni and G. Warnault, *Asymptotic behavior of blowing-up radial solutions for quasilinear elliptic systems arising in the study of viscous, heat, conducting fluids*, Differential and Integral Equations, 2023.