# SEMINÁRIO DE EQUAÇÕES DIFERENCIAIS

## The asymptotic behavior of constant sign and nodal solutions of $(p,q)$-Laplacian problems as $p$ goes to $1$

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**Resumo:** In this paper we study the asymptotic behavior of solutions to the $(p,q)$-equation

$$-\Delta_p u - \Delta_q u = f(x,u) \quad \text{in } \Omega, \qquad u = 0 \quad \text{on } \partial\Omega,$$

as $p \to 1^+$, where $N \geq 2$, $1 < p < q < 1^* := N/(N-1)$ and $f$ is a Carathéodory function that grows superlinearly and subcritically. Based on a Nehari manifold treatment, we are able to prove that the $(1,q)$-Laplace problem given by

$$-\operatorname{div}\left(\frac{\nabla u}{|\nabla u|}\right) - \Delta_q u = f(x,u) \quad \text{in } \Omega, \qquad u = 0 \quad \text{on } \partial\Omega,$$

has at least two constant sign solutions and one sign-changing solution, whereby the sign-changing solution has least energy among all sign-changing solutions. Furthermore, the solutions belong to the usual Sobolev space $W_0^{1,q}(\Omega)$ which is in contrast with the case of $1$-Laplacian problems, where the solutions just belong to the space $\mathrm{BV}(\Omega)$ of all functions of bounded variation. As far as we know this is the first work dealing with $(1,q)$-Laplace problems even in the direction of constant sign solutions.