

Sharp estimates for the first eigenvalue of the Robin p -Laplacian as p goes to 1

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The aim of the talk will be to describe some results regarding the behavior of the first eigenvalue of the p -Laplacian with Robin boundary conditions as p goes to 1. In particular, we study the Γ -limit of the functional

$$J_p(u) = \frac{\int_{\Omega} |\nabla u|^p + \beta \int_{\partial\Omega} |u|^p}{\int_{\Omega} |u|^p},$$

as $p \rightarrow 1$, where Ω is a smooth bounded open set in \mathbb{R}^N , $p > 1$ and β is a real number. Among our results, for $\beta > -1$, we derive an isoperimetric inequality for $\lambda(\Omega, 1, \beta)$, which is the limit as $p \rightarrow 1$ of

$$\lambda(\Omega, p, \beta) = \min_{u \in W^{1,p}(\Omega)} J_p(u).$$

This is a joint work with Carlo Nitsch, Francescantonio Oliva and Cristina Trombetti.