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Abstracts of Short Communications and Posters

Section:

10. Partial Differential Equations

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On a nonlinear eigenvalue problem
The nonlinear diffusion can be described by the nonlinear partial differential equation $\sum_{i=1}^{N} \frac{\partial}{\partial x_i}\left(|\nabla u|^{p-1}\nabla u\right) + \lambda |u|^{p-1}u = 0$ in $D \in R^N$.
We can consider it as a generalization of the linear partial differential equation $\Delta u + \lambda u = 0$. Another generalization of the linear equation is the following equation

$$\sum_{i=1}^{N} \frac{\partial}{\partial x_i}\Big[\Big|\frac{\partial u}{\partial x_i}\Big|^{p-1}\frac{\partial u}{\partial x_i}\Big] + \lambda |u|^{p-1}u = 0$$

in $D \in R^N$, where $0 < p < \infty$.
Our purpose is to show that the nonlinear eigenvalue problem in bounded domain has eigensolutions and corresponding eigenvalues. The classical solution for different domains D will be given when D is bounded by a rectangle or by a central symmetric convex curve.
References: F. de Thelin, Quelques résultats d'existence et de non-existence pour une E. D. P. elliptique non linéarie, C. R. Acad. Sci. Paris, 299, Série I. Math., pp. 911-914 (1984). W. Reichel, W. Walter, Radial solutions of equations and inequalities involving the p-Laplacian, J. of Inequal. and Appl., 1, pp. 47–71 (1997).