Meeting: 1003, Atlanta, Georgia, SS 28A, AMS-SIAM Special Session on Reaction Diffusion Equations and Applications, I

1003-35-1438 **Peter Takac*** (peter.takac@mathematik.uni-rostock.de), Institute for Mathematics, University of Rostock, Universitaetsplatz 1, D-18055 Rostock, Germany. *Nonlinear Spectral Problems for Elliptic and Parabolic Equations near the First Eigenvalue.*

We treat two Dirichlet problems for the p-Laplacian with a spectral parameter near the first eigenvalue λ_1:

$$-\Delta_p u = \lambda\,|u|^{p-2}u + f(x) \ \text{ in } \Omega; \qquad u = 0 \ \text{ on } \partial\Omega, \tag{1}$$

and

$$\begin{gathered} \frac{\partial u}{\partial t} - \Delta_p u = \lambda\,|u|^{p-2}u + f(x,t), \quad (x,t) \in \Omega \times (0,T_\infty); \\ u(x,t) = 0, \quad (x,t) \in \partial\Omega \times (0,T_\infty); \\ u(x,0) = u_0(x), \quad x \in \Omega. \end{gathered} \tag{2}$$

Here, $1 < p < \infty$ and $\lambda \in \mathbf{R}$ is near λ_1. The interval of existence in time, $(0,T_\infty)$, is assumed to be maximal. We show that, if $0 \leq f \not\equiv 0$ is in $L^\infty(\Omega)$ and $\lambda_1 < \lambda < \lambda_1 + \delta$, where $\delta > 0$ is small enough, then every solution of problem (1) is negative. If $f > 0$ and $u_0 \in C^1(\overline{\Omega})$ is arbitrary, possibly nonpositive, and $\lambda_1 < \lambda < \lambda_1 + \delta$, then there is some time $T \in (0,T_\infty)$ such that every solution of problem (2) satisfies $u(x,t) > 0$ for all $x \in \Omega$ and all $t \in (T,T_\infty)$. (Received October 05, 2004)