EIGENVALUES AND FUČIK-SPECTRUM OF THE RADIALLY SYMMETRIC p-LAPLACIAN

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For $p > 1$ we consider the p-Laplacian boundary value problem

$$\text{(1)} \qquad \operatorname{div}(|\nabla u|^{p-2}\nabla u) + (-q + \lambda w)|u|^{p-2}u = 0 \text{ on the ball } B_1(0) \subset \mathbb{R}^n$$

with homogeneous boundary conditions on $\partial B_1(0)$. Radially symmetric solutions satisfy an ordinary differential equation. We will discuss analytical and numerical tools to find all radial eigenvalues of the problem. In generalization to (1) we also discuss the boundary value problem

$$\text{(2)} \qquad \operatorname{div}(|\nabla u^{p-2}|\nabla u) - q|u|^{p-2}u + w\Big(\mu(u^+)^{p-1} - \nu(u^-)^{p-1}\Big) = 0 \text{ in } B_1(0)$$

with homogeneous boundary conditions, where $u^+(x) = \max\{u(x), 0\}$ and $u(x) = u^+(x) - u^-(x)$. A pair of constants $(\mu, \nu) \in \mathbb{R}^2$ for which a non-trivial solution u exists is called a Fučik-eigenvalue; the collection of all Fučik-eigenvalues is called the Fučik-spectrum. We describe the entire radial Fučik-spectrum analytically, and we give an algorithm for its computation. Numerical result will be presented.