

**“Local” and “global” variational eigenvalues of
the p -Laplacian and the Fredholm alternative**

Peter Takáč, Universität Rostock

We begin this lecture with a discussion of the famous Ljusternik-Schnirelmann characterization of *some* eigenvalues of nonlinear elliptic problems (by a minimax formula) which has a *global* variational character. Then we show that for some homogeneous quasilinear elliptic eigenvalue problems there are variational eigenvalues *other* than those of the Ljusternik-Schnirelmann-type. In contrast, these eigenvalues have a *local* variational character. Such phenomenon does not occur in typical linear elliptic eigenvalue problems, thanks to the Courant-Fischer theorem which is the linear analogue and predecessor of the Ljusternik-Schnirelmann theory. Finally, we present some existence and multiplicity results for the Fredholm alternative at the first (smallest) eigenvalue of the Dirichlet p -Laplacian. We will show some hints for proofs which combine variational and topological methods with linearization procedures.