

Calculation of Bifurcations via Nonlinear Collatz-Wielandt Variational Principle

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The talk is devoted to determining and computation of turning point type bifurcations for solutions $u_\lambda \in \mathbb{R}^n$, $\lambda \in (a, b)$ of nonlinear equations of the form

$$F(u, \lambda) := T(u) - \lambda G(u) = 0. \quad (\mathcal{F})$$

A theory where the bifurcation points (u^*, λ^*) are investigated by means of the nonlinear generalized Collatz-Wielandt variational principle

$$\lambda^* = \sup_{u \in S} \inf_{\psi \in \Sigma} \frac{\langle T(u), \psi \rangle}{\langle G(u), \psi \rangle} \quad (\mathcal{P})$$

will be presented.

We shall exhibit the method on the examples of the finding bifurcations of the boundary value problems for nonlinear elliptic equations. Particular attention will be given for the numerical implementation to the method.