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A multiplicity result for a class of superquadratic Hamiltonian systems. (English)

Zbl 1034.35046

Electron. J. Differ. Equ. 2003, Paper No. 15, 14 p. (2003).

Let $\Omega \subset \mathbb{R}^n$ be a bounded smooth domain. For a small real parameter $\lambda > 0$ the authors study the system

$$-\Delta v = \lambda f(u),\ -\Delta u = g(v) \quad \text{in } \Omega, \quad u = v = 0 \text{ on } \partial\Omega.$$

Since the function g is assumed to be continuous and strictly increasing and to satisfy $g(\mathbb{R}) = \mathbb{R}$, the inverse function $g^{-1} : \mathbb{R} \to \mathbb{R}$ exists; and the system may be rewritten as quasilinear fourth order equation

$$\Delta\big(g^{-1}(\Delta u)\big) = \lambda f(u)$$

under Navier boundary conditions:

$$u = \Delta u = 0 \text{ on } \partial\Omega.$$

For the latter problem, the existence of two nontrivial solutions is shown under superlinearity and subcriticality assumptions on the nonlinearities f and g. One solution is constructed by means of the classical mountain pass lemma, and the second by local minimization.

Reviewer: Hans-Christoph Grunau (Magdeburg)

MSC:

35J65 Nonlinear boundary value problems for linear elliptic equations
35J35 Variational methods for higher-order elliptic equations

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