Potential systems with mean curvature operator in Minkowski space

Gurban Daniela Ana
West University, Timişoara, Romania

Using critical point theory for lower semicontinuous convex perturbations of a C^1 functional, we establish the existence of multiple nontrivial solutions for one parameter potential systems of type

$$\begin{cases} \mathcal{M}(u) = \mu_1(x)|u|^{q_1-1}u - \lambda F_u(x,u,v), & x \in \Omega, \\ \mathcal{M}(v) = \mu_2(x)|v|^{q_2-1}v - \lambda F_v(x,u,v), & x \in \Omega, \\ u|_{\partial\Omega} = 0 = v|_{\partial\Omega}. \end{cases}$$

Here, Ω is a bounded domain in $\mathbb{R}^N$ $(N \geq 2)$ with boundary $\partial\Omega$ of class C^2, $\mathcal{M}$ is the mean curvature operator in Minkowski space:

$$\mathcal{M}(u) = \operatorname{div}\left(\frac{\nabla u}{\sqrt{1-|\nabla u|^2}}\right),$$

$F : \Omega \times \mathbb{R}^2 \to \mathbb{R}$ is a Carathéodory function, with $F(x,\cdot,\cdot)$ of class C^1 for a.e. $x \in \Omega$, satisfying an appropriate L^∞–growth condition. The constants $q_1, q_2 > 0$ are fixed, $\mu_1, \mu_2 \in L^\infty(\Omega)$ are positive (i.e. ≥ 0 a.e. in Ω) functions and $\lambda > 0$ is a real parameter.

We essentially employ a technique introduced in [1].

The talk is based on joint work with Petru Jebelean and Călin Şerban.

[1] C. Bereanu, P. Jebelean, and J. Mawhin, The Dirichlet problem with mean curvature operator in Minkowski space – a variational approach, *Adv. Nonlinear Stud.* **14** (2014), 315–326.

[2] D. Gurban, P. Jebelean, and C. Şerban, Nontrivial solutions for potential systems involving the mean curvature operator in Minkowski space, *submitted.*