Positive radial solutions for systems involving potential Lane-Emden nonlinearities and Minkowski operator

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Using topological degree arguments, critical point theory and lower and upper solutions method we establish non-existence, existence and multiplicity of radial positive solutions for one parameter systems involving Lane-Emden type nonlinearities,

$$\begin{cases} \mathcal{M}(\mathrm{u}) + \lambda\mu(|x|)(p+1)\mathrm{u}^p\mathrm{v}^{q+1} = 0, & \text{in } \mathcal{B}(R), \\ \mathcal{M}(\mathrm{v}) + \lambda\mu(|x|)(q+1)\mathrm{u}^{p+1}\mathrm{v}^{q} = 0, & \text{in } \mathcal{B}(R), \\ \mathrm{u}|_{\partial\mathcal{B}(R)} = 0 = \mathrm{v}|_{\partial\mathcal{B}(R)}. \end{cases}$$

Here, $\mathcal{B}(R) = \{x \in \mathbb{R}^N : |x| < R\}$, $N \geq 2$ is an integer, $\mu : [0, R] \to [0, \infty)$ is continuous, $\mu > 0$ on $(0, R]$, the exponents p, q are positive, with $\max\{p, q\} > 1$ and $\mathcal{M}$ stands for the mean curvature operator in Minkowski space

$$\mathcal{M}(\mathrm{w}) = \mathrm{div}\left(\frac{\nabla \mathrm{w}}{\sqrt{1 - |\nabla \mathrm{w}|^2}}\right).$$

This talk is based on joint work with Petru Jebelean and Călin Şerban [1, 2].

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References

[1] D. Gurban and P. Jebelean, *Positive radial solutions for systems with mean curvature operator in Minkowski space*, Rend. Istit. Mat. Univ. Trieste, accepted.

[2] D. Gurban, P. Jebelean and C. Şerban, *Nontrivial solutions for potential systems involving the mean curvature operator in Minkowski space*, Adv. Nonlinear Stud. (2017), DOI: 10.1515/ans-2016–6025.