Least energy nodal solutions of Hamiltonian elliptic systems with Neumann boundary conditions

Hugo Tavares[1], Alberto Saldaña[2]

[1] Universidade de Lisboa

[2] Karlsruhe Institute of Technology

In this talk we will discuss existence, regularity, and qualitative properties of solutions to the Hamiltonian elliptic system system

$$\begin{cases} -\Delta u = |v|^{q-1}v & \text{in } \Omega, \\ -\Delta v = |u|^{p-1}u & \text{in } \Omega, \\ \partial_\nu u = \partial_\nu v = 0 & \text{on } \partial\Omega, \end{cases}$$

with $\Omega \subset \mathbb{R}^N$ bounded, both in the sublinear $pq < 1$ and superlinear $pq > 1$ problems, in the subcritical regime. In balls and annuli we show that least energy solutions (l.e.s.) are *not* radial functions, but only partially symmetric (namely foliated Schwarz symmetric). A key element in the proof is a new L^t-norm-preserving transformation, which combines a suitable flipping with a decreasing rearrangement. This combination allows us to treat annular domains, sign-changing functions, and Neumann problems, which are non-standard settings to use rearrangements and symmetrizations. Our theorems also apply to the scalar associated model, where our approach provides new results as well as alternative proofs of known facts.

References

[1] A. Saldaña, H. Tavares , *Least energy nodal solutions of Hamiltonian elliptic systems with Neumann boundary conditions*, Journal of Differential Equations 265 (2018), 6127–6165