

Symmetry breaking for a supercritical elliptic problem in an annulus

Francesca Colasuonno
Dipartimento di Matematica
Alma Mater Studiorum Università di Bologna

In this talk, I will present an existence result for the Dirichlet problem associated with the elliptic equation

$$-\Delta u + u = a(x)|u|^{p-2}u$$

set in an annulus of \mathbb{R}^N . Here $p > 2$ is allowed to be supercritical in the sense of Sobolev embeddings, and $a(x)$ is a positive weight with additional symmetry and monotonicity properties, which are shared by the solution that we construct. For this problem, we find a new type of positive, axially symmetric solutions. Moreover, in the case where the weight $a(x)$ is constant, we detect a condition, depending only on the exponent p and on the inner radius of the annulus, that ensures that the solution is nonradial. In this setting, the major difficulty to overcome is the lack of compactness in a nonradial framework. The proofs rely on a combination of variational methods and dynamical system techniques.

This is joint work with Alberto Boscaggin (Università di Torino), Benedetta Noris (Politecnico di Milano), and Tobias Weth (Goethe-Universität Frankfurt).