
Symmetry and monotonicity results for solutions of semilinear PDEs in sector-like domains

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In the field of PDEs, Morse theory is used to infer the existence of critical points of a functional from topological arguments. The theory allows to prove that some problems have multiple solutions with different Morse index. It is frequently observed that solutions whose Morse index is small have a simpler shape in comparison to others. I report on a work in progress with Francesca Gladiali from the University of Sassari concerning a mixed boundary-value problem for a semilinear elliptic equation in a sector-like domain. We prove that solutions whose Morse index does not exceed 1 must either be axially symmetric (i.e., radial in the plane), or monotone with respect to the angular variable. Classical references on Morse theory are those of Bott, Milnor, and Morse. More specific references on the talk's subject are found in the papers by Gladiali, Pacella, Weth and in a recent book by Damascelli and Pacella.