Titolo del corso: Qualitative properties of solutions of p-Laplace equations

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Membro del collegio proponente:

Ore frontali di lezione: 20

Periodo di lezione: aprile-maggio 2025;

Settore/i disciplinare del corso: Math/05

Tipologia di corso: Base

Modalità di verifica dell'apprendimento: seminario

Abstract del corso:

The course aims at providing an overview on classical and more recent results concerning qualitative properties like symmetry and monotonicity of positive solutions of both semilinear and quasilinear PDEs. The importance of knowing a priori certain qualitative properties may result in clear simplifications when looking for the existence of solutions to nonlinear PDEs. The most famous technique used to prove such results is the moving plane method introduced by Aleksandrov and Serrin. The main analytical tools required to make this method efficient are weak and strong maximum (or comparison) principles, maximum (or comparison) principles in small domains and Hopf Lemma. Starting from the seminal paper of Gidas, Ni and Nirenberg, we will present several variants of their results, including the model case of the p-Laplacian, cooperative elliptic systems and possibly the case of singular solutions

Programma del corso:

- weak and strong maximum principles for Laplace equations with zero order term;
- maximum principle in small domains for Laplace equation;
- moving plane method for classical solutions of semilinear elliptic equations;
- weak and strong comparison principles (even in small domains) for p-Laplace-type equations;
- weighted Sobolev inequalities;
- moving plane method for weak solutions of quasilinear elliptic equations.