

VISCOSITY SOLUTIONS OF p -LAPLACIAN TYPE EQUATIONS, $1 < p \leq \infty$

JUAN J MANFREDI

manfredi@pitt.edu

Department of Mathematics

301 Thackeray Hall

University of Pittsburgh

Pittsburgh PA, 15260, USA

Division of Mathematical Sciences, Suite 1025

National Science Foundation

4201 Wilson Blvd.

Arlington, VA 22230, USA

In the first part of the talk we will compare three different notions of weak solutions of the p -Laplace equation: Sobolev weak solutions based on distributional derivatives, semi-continuous weak solutions based on the comparison principle, and viscosity solutions based on generalized point-wise derivatives or jets. For $1 < p < \infty$ it is easy to show that Sobolev weak solutions are semi-continuous weak solutions and that these are viscosity solutions. In fact, viscosity solutions are semi-continuous weak solutions. A sketch of the proof, ultimately based on Jensen's comparison principle will be presented.

In the second part, we concentrate on the case $p = \infty$, where we are forced to use viscosity solutions. We will present applications to ∞ -harmonic functions, and discuss the ∞ -eigenvalue problem.