

Discrete Averaging Properties for Nonlinear Elliptic PDEs

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The mean value property is both a theoretical and computational tool when working with harmonic functions. In this talk I will discuss several extensions of this averaging property, both in the continuous and in the discrete setting for nonlinear elliptic PDEs, especially the p -Laplacian. I then use this property to characterize the existence and uniqueness for PDEs which are not in divergence form, ultimately obtaining a fully discrete numerical scheme for their approximation. Unexpected relationships with modern algebra arise and are discussed for various higher dimensional polytopes.