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Sobolev Inequalities and the Solvability of Second Order Degenerate Elliptic Equations with rough low order terms

In this talk I will present joint work with D. Cruz-Uribe, Y. Zeren, S. Cetin, and F. Dal concerning the existence of weak solutions to linear degenerate elliptic PDEs with rough low order terms of the form

$$-\frac{1}{v}\text{Div}(Q\nabla u) + HRu + S'Gu + Fu = f + T'g$$

where $Q=Q(x)$ may have vanishing eigenvalues, R , S , and T are first order vector fields, and the coefficients H , G , F are measurable functions in a function space related to the gain in a given Sobolev Inequality. The results are presented in the context of a matrix weighted Sobolev inequality with gain on an Orlicz Scale. Following this and time permitting, I will present some ideas on the production of matrix weighted Sobolev inequalities in joint work with D. Cruz-Uribe and F. Dal.