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Poincaré Inequalities and Neumann problems for the p-Laplacian

Reporting on joint work with D. Cruz-Uribe and E. Rosta, I will discuss an equivalence between the validity of a matrix weighted Poincaré inequality and the existence of a regular weak solution to a Neumann problem for a degenerate p-Laplacian. The Poincaré inequalities discussed are formulated in the context of degenerate Sobolev spaces defined in terms of a quadratic form, and the associated matrix is the source of the degeneracy in the p-Laplacian.