



# Quasilinear elliptic equations and weighted Sobolev-Poincaré inequalities with distributional weights

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We introduce a class of weak solutions to the quasilinear equation  $-\Delta_p u = \sigma |u|^{p-2} u$  in an open set  $\Omega \subset \mathbb{R}^n$ . Here  $p > 1$ , and  $\Delta_p u$  is the  $p$ -Laplacian operator. Our notion of solution is tailored to general distributional coefficients  $\sigma$  satisfying a certain weighted Sobolev-Poincaré inequality. We also study weak solutions of the closely related equation  $-\Delta_p v = (p-1)|\nabla v|^p + \sigma$ , under the same conditions on  $\sigma$ . Our results for this latter equation will allow us to characterize the class of distributions  $\sigma$  which satisfy the Sobolev-Poincaré inequality, thereby extending earlier results on the form boundedness problem for the Schrödinger operator to  $p \neq 2$ .

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