

Existence of renormalized solutions to elliptic and parabolic equations in Musielak-Orlicz space

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We prove existence of renormalized solutions to general nonlinear elliptic equation in Musielak-Orlicz space avoiding growth restrictions. Namely, we consider

$$-\operatorname{div} A(x, \nabla u) = f \in L^1(\Omega),$$

on a Lipschitz bounded domain in \mathbb{R}^n . The growth of the monotone vector field A is controlled by a generalized nonhomogeneous and anisotropic N -function M . The approach does not require any particular type of growth condition of M or its conjugate M^* (neither Δ_2 , nor ∇_2). The condition we impose is log-Hölder continuity of M , which results in good approximation properties of the space. The parabolic version of the equation

$$\partial_t u - \operatorname{div} A(x, \nabla u) = f \in L^1(\Omega_T),$$

is also examined.