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Interpolation spaces and applications to the regularity of some quasilinear PDEs

We present some well-known and new results for identifying some interpolation spaces on nonlinear interpolation of α-Hölderian mappings between normed spaces. We apply these results to obtain some regularity results on the gradient of the weak or entropic-renormalized solution u to the homogeneous Dirichlet problem for quasilinear equations of the form

$$-\mathrm{div}\,(\widehat{a}(\nabla u)) + V(u) = f,$$

where Ω is a bounded smooth domain of $\mathbb{R}^n$, V is a nonlinear potential and f belongs to non-standard spaces like Lorentz-Zygmund spaces. The presentation is based on the papers [1] and [2].

References.

[1] Ahmed, I. Fiorenza, A.; Formica, M. R.; Gogatishvili, A.; El Hamidi, A.; Rakotoson, J. M., Quasilinear PDEs, interpolation spaces and Hölderian mappings, *Anal. Math.* 49 (2023), no. 4, 895–950.

[2] Ahmed, I. Fiorenza, A.; Formica, M. R.; Gogatishvili, A.; El Hamidi, A.; Rakotoson, J. M., Applications of Interpolation theory to the regularity of some quasilinear PDEs., Proceedings of the International Scientific Online Conference 'Algebraic and geometric methods of analysis', AGMA 2024 May 27-30, 2024, Ukraine, Proceedings of the International Geometry Center, 2024, 35 pages.

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