

Regularity for non-uniformly elliptic equations

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I discuss local regularity properties of solutions of certain linear and nonlinear non-uniformly elliptic equations. We start with weak solutions of the linear equation

$$\nabla \cdot a(x)\nabla u(x) = 0.$$

Assuming certain integrability conditions on the ellipticity contrast of the coefficient field a , we obtain local boundedness and validity of Harnack inequality. The assumed integrability assumptions are sharp and improve upon classical results in the literature.

Moreover, we consider variational integrals with (p, q) -growth and provide local boundedness and Lipschitz regularity for minimizer under improved (and in case of local boundedness optimal) relations between p , q and the dimension.

The talk is based on joint works with P. Bella (TU Dortmund) and J. Hirsch (U Leipzig).

References

- [1] P. Bella and M. Schäffner, Local Boundedness and Harnack Inequality for Solutions of Linear Nonuniformly Elliptic Equations. *Comm. Pure Appl. Math.* doi:10.1002/cpa.21876.
- [2] P. Bella and M. Schäffner, On the regularity of minimizers for scalar integral functionals with (p, q) -growth. arXiv:1904.12279 [math.AP] (to appear *Anal. PDE*).
- [3] J. Hirsch and M. Schäffner, Growth conditions and regularity, an optimal local boundedness result. *Comm. Cont. Math.* <https://doi.org/10.1142/S0219199720500297>