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Strongly nonlinear Robin problems for harmonic functions in the half-space

In this talk, I will discuss existence and global regularity results for boundary-value problems of Robin type for harmonic functions in n-dimensional half-spaces. The Robin condition on the normal derivative on the boundary of the half-space will be prescribed by a nonlinear function $\mathcal{N}$ of the relevant harmonic functions. General Orlicz type growths for the function $\mathcal{N}$ will be considered. For instance, functions $\mathcal{N}$ of classical power type, their perturbations by logarithmic factors, and exponential functions will be allowed. New sharp boundedness properties in Orlicz spaces of some classical operators from harmonic analysis, of independent interest, will be critical for our approach.

This is a joint work with Andrea Cianchi and Gael Diebou Yomgne.