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TWO-PHASE FREE BOUNDARY PROBLEMS DRIVEN BY DEGENERATE ELLIPTIC OPERATORS

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In this conference I will present results about sharp regularity estimates for minimizers of non-differentiable functionals whose Euler-Lagrange equation is given by a singular PDEs of order $\sim \gamma u^{\gamma-1}$, $0 < \gamma < 1$, ruled by p-degenerate elliptic operators, with no sign constraints. The goal is the free boundary regularity of two-phase cavity-type problems governed by degenerate elliptic operators. Such a theory remained unaccessible through current literature due to lack of monotonicity formulae for degenerate elliptic equations. The strategy relies on an asymptotic varying singularity technique based on the exponent γ, which tends to 0^+. Others important ingredients are a local bound for the gradient of such minimizers uniformly in γ and geometric estimates involving a minimum and its free boundary. This is joint work with Eduardo Teixeira, from UFC–Fortaleza.

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