Free Boundary Problems in PDEs and Related Issues

Diego Marcon (Universidade Federal do Rio Grande do Sul - Brasil)
Título: Obstacle-type problems in nonlocal settings.

Resumo: We present two models in relation to the classical obstacle problem. First, we consider a free boundary optimization for the fractional Laplacian operator with volume and lower bound constraints, which was inspired by local heat conduction models. We provide not only geometric properties of solutions, but also of the corresponding free boundaries. Next, we describe a parabolic obstacle problem that naturally arises in the pricing of American options. The parabolic operator that shows up is a combination of nonlocal diffusion terms with a drift term. We prove optimal regularity of solutions in space and almost optimal regularity in time.