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Minimizers for the thin one-phase problem. Preliminary report.

We consider the thin one-phase free boundary problem, associated to minimizing a weighted Dirichlet energy of the function in the half-space plus the area of the positivity set of that function restricted to the boundary. I will provide a rather complete picture of the (partial) regularity of the free boundary, providing content and structure estimates on the singular set of the free boundary when it exists. All of these results hold for the full range of the relevant weight related to an anomalous diffusion on the boundary. The approach does not follow the standard one introduced in the seminal work of Alt and Caffarelli. Instead, the nonlocal nature of the distribu- tional measure associated to a minimizer necessitates arguments which are less reliant on the underlying PDE. This opens several directions of research that I will try to describe. (Received August 30, 2019)