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Laplacian Growth as a Paradigm for Integrable Interface Dynamics

Abstract

An arbitrary interface in two-dimensional Laplacian growth can be represented as resulting from the evolution of an initial circle under a specific distribution of sources in the exterior domain. We are solving the inverse potential problem (which stems from Isaac Newton) to recover the singularities of the moving interface from an arbitrary distribution of sources. Finally, the obtained classes of exact solutions are applied to several experimental problems in viscous fingering processes, taking place in the Hele-Shaw cell.