1145-35-1053   **Xuming Xie*** (`xuming.xie@morgan.edu`), Dept. of Math., Morgan State University, Baltimore, MD 21251. *Existence and Selection of Saffman-Taylor Fingers by Kinetic Undercooling.*

The selection of Saffman-Taylor fingers by surface tension has been extensively investigated. In this paper we are concerned with the existence and selection of steadily translating symmetric finger solutions in a Hele-Shaw cell by small but non-zero kinetic undercooling (ϵ^2). We rigorously conclude that for relative finger width λ near one half, symmetric finger solutions exist in the asymptotic limit of undercooling $\epsilon^2 \to 0$ if the Stokes multiplier for a relatively simple nonlinear differential equation is zero. This Stokes multiplier S depends on the parameter $\alpha \equiv \frac{2\lambda-1}{(1-\lambda)}\epsilon^{-\frac{4}{3}}$ and earlier calculations have shown this to be zero for a discrete set of values of α. While this result is similar to that obtained previously for Saffman-Taylor fingers by surface tension, the analysis for the problem with kinetic undercooling exhibits a number of subtleties. The main subtlety is the behavior of the Stokes lines at the finger tip, where the analysis is complicated by non-analyticity of coefficients in the governing equation.