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Xuming Xie*, 1700 Cold Spring Lane, Baltimore, MD 21251. *Local smoothing effect and existence for the one-phase Hele-Shaw problem.* Preliminary report.

We study an initial value problem for the one phase Hele-Shaw problem with and without surface tension. We establish local well-posedness for the initial value problem in Sobolev space. Furthermore, we obtain that, on average in time and compared to the initial data, the solution gains $3/2$ derivative of smoothness in spatial variable for nonzero surface tension case and $1/2$ derivative for zero tension case. (Received July 31, 2010)