Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

A reduced model for salt-fingering convection in the small Lewis number limit[1] JIN-HAN XIE, EDGAR KNOBLOCH, Univ of California - Berkeley — We derive a reduced model that captures key features of salt-fingering convection, including secondary instabilities, in the asymptotic limit of small Lewis number and large flux ratio. In the infinite Prandtl number limit, this model combines a prognostic equation for the evolution of the salinity field with a novel diagnostic relation between the streamfunction and salinity. When the salinity and temperature Rayleigh numbers Ra_S and Ra_T are large, simulations reveal the existence of statistically steady saturated states, characterized by fluxes and kinetic energy that scale as powers of $(Ra_S/Ra_T) - 1$. Three distinguished regimes are identified: a weakly nonlinear regime and two strongly nonlinear regimes characterized by distinct exponents. The processes responsible for saturation are described in detail and the probability density function of the saturated fields is determined.

[1]This work was supported by the National Science Foundation under grant No. DMS-1317666.

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Date submitted: 29 Jul 2016 Electronic form version 1.4