Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

The Non-linear Saturation of the Goldreich-Schubert-Fricke Instability JEFFREY OISHI, State Univ of NY - Farmingdale, KEATON BURNS, MIT, BEN BROWN, University of Colorado, Boulder, DANIEL LECOANET, University of California, Berkeley, GEOFFREY VASIL, University of Sydney — The Goldreich-Schubert-Fricke (GSF) instability is an important process in stellar interiors and possibly in exoplanetary atmospheres. While the linear phase of the instability has been explored for nearly fifty years, its non-linear saturation has not been explored in detail. The GSF is a double-diffusive instability in which Rayleigh unstable perturbations are robbed of buoyant stability by thermal diffusion. Here, we will present results from a suite of direct numerical simulations using the Spiegel-Veronis Boussinesq equations in the Dedalus framework. These DNS are designed to explore the behavior of the GSF over a range of Prandtl numbers. In stellar interiors, $\mathrm{Pr} \simeq 10^{-6}$, but we are limited by computational resources to much higher values, so instead we will discuss the Pr scaling of transport and mixing. We will also discuss the impact of the Boussinesq approximation in the case where large aspect ration perturbations exceed a scale height.

Jeffrey Oishi
State Univ of NY - Farmingdale

Date submitted: 03 Aug 2015 Electronic form version 1.4