Horizontal infinite-Prandtl-number convection SUNNY CHIU-
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— Differential heating of a horizontal surface in a finite fluid volume, leading to so-
called horizontal convection, is a hot topic for both the oceans and glass furnaces.
Here we investigate the infinite-Prandtl-number limit relevant to the latter, using
numerics and scaling arguments. Two regimes are identified, and universal scaling
functions are found for the transition between the regimes. Conclusive numerical evi-
dence is presented for the Rossby boundary-layer scaling for both rigid and shear-free
boundary conditions. The surprising lack of dependence on the boundary condition
is explained by showing that the return flow comprises of a horizontal intrusion at
the bottom of the horizontal boundary layer, and a weak downwelling plume that
returns at depth. We also present results for highly temperature-dependent viscosity.

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