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Numerical Investigations of Convection[1] BRANDON CLOUTIER, PAUL RIGGE, JARED WHITEHEAD, BENSON MUITE, University of Michigan, HANS JOHNSTON, University of Massachusetts Amherst — We report on high resolution numerical studies of infinite Prandtl number convection using a simplified model with relevance to the motion of the Earth's mantle. Our model uses Navier-Stokes equations with the Boussinesq approximation and free slip velocity boundary conditions that is driven soley by internal heating. The 2D simulations are calculated using pseudospectral Fourier and Chebyshev methods. We examine the transition from conduction to steady convection, to unsteady laminar convection and lastly to chaotic convection. As the heating rate is increased, we report on the relationship between the non- dimensional heat Rayleigh number (proportional to the heating rate) and the averaged temperature (spatially and temporally). We also compare different aspect ratios (width to height) to see the impact this change has on our system.

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Brandon Cloutier
University of Michigan

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