1154-VN-2160 **Yu Cao*** (cao20@iu.edu). *Rayleigh-Bénard Problem (2D): A Determining Form and Algebraic Bounds on the Global Attractor.*

We construct a determining form for the 2D Rayleigh-Bénard (RB) problem in a strip with solid horizontal boundaries, in the cases of no-slip and stress-free boundary conditions. The determining form is an ODE in a Banach space of trajectories whose steady states comprise the long-time dynamics of the RB system. In fact, solutions on the global attractor of the RB system can be further identified through the zeros of a scalar equation to which the ODE reduces for each initial trajectory. The twist in this work is that the trajectories are for the velocity field only, which in turn determines the corresponding trajectories of the temperature. This is a joint work with Michael Jolly and Edriss Titi.

In the case of stress-free boundary conditions, we show bounds for various Sobolev norms of solutions in the global attractor. All these bounds are algebraic in the viscosity and thermal diffusivity, a significant improvement over previously established estimates. The sharpness of the bounds are tested with numerical simulations. This is a joint work with Michael Jolly, Edriss Titi and Jared Whitehead. (Received September 17, 2019)