Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

Interacting Stokes layers and wall modes in modulated rotating convection ANTONIO RUBIO, JUAN LOPEZ, Arizona State University, FRANCISCO MARQUES, Universitat Politècnica de Catalunya — Thermal convection in a rotating cylinder near onset is investigated using direct numerical simulations of the Navier–Stokes equations with the Boussinesq approximation in a regime dominated by the Coriolis force. For thermal driving too small to support convection throughout the entire cell, convection sets in as alternating pairs of hot and cold plumes in the sidewall boundary layer, the so-called wall modes of rotating convection. We subject the wall modes to small amplitude harmonic modulations of the rotation rate over a wide range of frequencies. The modulations produce Stokes boundary layers which drive a time-periodic large-scale circulation that interacts with the wall-localized thermal plumes in a non-trivial manner. The resultant phenomena include a substantial shift in the onset of wall mode convection to higher temperature differences for a broad band of frequencies, as well as a significant alteration of the precession rate of the wall mode at very high modulation frequencies due to the mean azimuthal streaming flow resulting from the modulations.

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Date submitted: 06 Aug 2008 Electronic form version 1.4