Geophysical Research Abstracts,
Vol. 10, EGU2008-A-01783, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-01783
EGU General Assembly 2008

ISS experiment GEOFLOW: non-rotational and rotational regimes of thermal convection in rotating spherical shells

B. Futterer (1), K. Bergemann (2), F. Feudel (2), L. Tuckerman (3), C. Egbers (1)

(1) Brandenburg University of Technology Cottbus, Germany (futterer@tu-cottbus.de), (2) University of Potsdam, Germany (fred@agnld.uni-potsdam.de), (3) PMMH-ESPCI, Paris, France (laurette@pmmh.espci.fr)

GEOFLOW is an experiment on thermal convection in rotating spherical shells influenced by central buoyancy force field. This experiment takes place at International Space Station ISS in European Columbus Modul inside the Fluid Science Laboratory (FSL). Central force field is produced using the effect of an dielectrophoretic force field by impressing a high voltage on the inner sphere. Optical measurement methods as Wollaston shearing interferometry is used to determine the temperature fields and flow patterns.

Here we present numerical preliminary studies which focus on dynamics of non-rotational and rotational regimes. For non-rotational case an approach combining numerical simulations with a spectral time-stepping code and path-following techniques allows the computation of both stable and unstable solution branches of stationary states. The transition from the stationary to the time-dependent regime is described.

Direct numerical simulation of rotational regimes show bifurcation from basic via periodic and quasi-periodic state into chaos. In the low rotation regime drift of time-dependent solutions is prograde while in the higher rotation regime drift is retrograde with rotation of the sphere.

We expect to compare those numerical predictions of different thermal flow states with first experimental data from ISS experiment.