Abstract Submitted for the DFD10 Meeting of The American Physical Society

Experimental Determination of Zonal Winds Driven by Tides CYPRIEN MORIZE, FAST, MICHAEL LE BARS, PATRICE LE GAL, IRPHE, ANDREAS TILGNER, University of Göttingen, MORIZE COLLABORATION, LE BARS, LE GAL TEAM, TILGNER COLLABORATION — We describe a new phenomenon of zonal wind generation by tidal forcing. Following a recent theoretical and numerical analysis [A. Tilgner, Phys. Rev. Lett. 99, 194501 (2007)], we present the first experimental evidence that the nonlinear self-interaction of a tidally forced inertial mode can drive an intense axisymmetric flow in a rotating deformed sphere. Systematic measurements of zonal flows are carried out by an embarked system of particle image velocimetry, allowing the determination of general scaling laws. These results are fully relevant for zonal winds generation in planets and stars, and illustrate a generic mechanism of geostrophic flow generation by periodic forcing.

> Cyprien Morize Laboratoire FAST

Date submitted: 28 Jul 2010

Electronic form version 1.4