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Symmetry breaking of the onset of convection in a rotating spherical gap¹ ANTJE BRUCKS, Zentrum für angewandte Raumfahrttechnologie und Mikrogravitation, Am Fallturm, 28359 Bremen, Germany — The technique of particle image velocimetry is used to study the natural convection in a rotating spherical gap of $r_1/r_2 = 0.4$ filled with silicon oil. The main subject of the study is the symmetry breaking with increasing rotation rate. Our measurements are conducted for Rayleigh numbers $10^5 < Ra < 10^7$ and Taylor numbers up to $Ta = 10^6$. Starting at $m = 2$, the mode number of the retrograde drifting vortices is increasing with Taylor number. The three dimensional vortex structures are characterized by their time dependent velocity and vorticity fields. We can show that the symmetry breaking is a Hopf bifurcation. However, as the vortex dynamics is influenced by a combination of centrifugal and Coriolis effects it shows a complex behaviour.

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