1035-76-45 **William F. Langford*** (wlangfor@uoguelph.ca), Dept. of Mathematics and Statistics, University of Guelph, 50 Stone Road East, Guelph, Ontario N1G2W1, Canada, and **Gregory M. Lewis**. *Hysteresis in a Rotating Differentially Heated Spherical Shell of Boussinesq Fluid.*

A mathematical model of convection of a Boussinesq fluid in a rotating spherical shell is analyzed using numerical computations guided by bifurcation theory. The fluid is differentially heated on its inner spherical surface, with the temperature increasing from both poles to a maximum at the equator. The model is assumed to be both rotationally symmetric about the polar axis and reflectionally symmetric across the equator. This work is an extension to spherical geometry of previous work on the differentially heated rotating annulus and the Taylor-Couette experiment. The spherical geometry is motivated by applications to planetary atmospheres. As the temperature gradient increases from zero, large Hadley cells extending from equator to poles form immediately. For larger temperature differences, first two and then three convection cells appear in each hemisphere. An organizing centre is shown to exist, at which two saddlenode bifurcations come together in a codimension-2 hysteresis bifurcation (or cusp) point, providing a mechanism for hysteretic transitions between different cell patterns as the temperature gradient is varied. (Received June 19, 2007)