1015-35-55 **C Hsia** (chsia@indiana.edu), Department of Mathematics, Indiana University, Bloomington, IN 47405, **Tian Ma**, School of Mathematics, Sichuan University, Chengdu, Sichuan, Peoples Rep of China, and **Shouhong Wang*** (showang@indiana.edu), Department of Mathematics, Indiana University, Bloomington, IN 47405. *Bifurcation and Stability for Double-Diffusive Convections.*

We present a bifurcation and stability analysis on the double-diffusive convection. The main objective is to study 1) the mechanism of the saddle-node bifurcation and hysteresis for the problem, 2) the formation, stability and transitions of the typical convection structures, and 3) the stability of solutions. It is proved in particular that there are two different types of transitions: continuous and jump, which are determined explicitly using some physical relevant nondimensional parameters. It is also proved that the jump transition always leads to the existence of a saddle-node bifurcation and hysteresis phenomena.

The analysis is based on a bifurcation theory for nonlinear partial differential equations developed recently by two of the authors. This bifurcation theory is centered at a new notion of bifurcation, called attractor bifurcation for dynamical systems, both finite dimensional and infinite dimensional. The main ingredients of the theory include a) the attractor bifurcation theory, b) steady state bifurcation for a class of nonlinear problems with even order non-degenerate nonlinearities, regardless of the multiplicity of the eigenvalues, and c) new strategies for the Lyapunov-Schmidt reduction and the center manifold reduction procedures. (Received January 18, 2006)