1023-35-1585 **Jungho Park*** (junjupar@indiana.edu), Department of Mathematics, Rawles Hall, 3rd St., Bloomington, IN 47408. *Two-dimensional infinite Prandtl number convection : Structure of bifurcated solutions.*

We study in this talk the bifurcation, stability and the structure of the bifurcated solutions of two-dimensional infinite Prandtl number convection problem. We prove that the problem bifurcates form the trivial solution to an attractor $\Sigma_R$ when the Rayleigh number $R$ crosses the first critical Rayleigh number $R_c$. Concerning the structure of the solutions, we prove that the bifurcated attractor $\Sigma_R$ consists exactly one cycle of steady state solutions and $\Sigma_R$ is homeomorphic to $S^1$. One of the other main results deals with the structure and its transition of the solutions of the infinite Prandtl number convection in the physical spaces and we prove that the bifurcated solutions are structurally stable. It leads us to the justification of the roll structure for the two-dimensional infinite Prandtl number convection problem as physical experiences suggested. The bifurcation analysis is based on the new bifurcation theory developed by T. Ma and S. Wang called attractor bifurcation. (Received September 26, 2006)