1057-35-94 **Dhanapati Adhikari** (dadhika@math.okstate.edu), Department of Mathematics, Oklahoma State University, Stillwater, OK 74078, **Chongsheng Cao** (caoc@fiu.edu), Department of Mathematics, Florida International University, Miami, FL 33199, and **Jiahong Wu*** (jiahong@math.okstate.edu), Department of Mathematics, Oklahoma State University, Stillwater, OK 74078. *The 2D Boussinesq Equations with vertical viscosity and vertical diffusivity.*

This talk presents recent results on the global regularity of classical solutions to the 2D Boussinesq equations with vertical dissipation and vertical thermal diffusion. We prove that the L^r-norm of the vertical velocity v for any $1 < r < \infty$ is globally bounded and that the L^∞-norm of v controls any possible breakdown of classical solutions. In addition, we show that an extra thermal diffusion given by the fractional Laplace $(-\Delta)^\delta$ for $\delta > 0$ would guarantee the global regularity of classical solutions. (Received January 12, 2010)