Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Salinity transfer in double diffusive convection bounded by two parallel plates YANTAO YANG, ERWIN P. VAN DER POEL, RODOLFO OSTILLA-MONICO, CHAO SUN, Physics of Fluids Group, Faculty of Science and Technology, University of Twente, 7500 AE Enschede, The Netherlands, ROBERTO VERZICCO, Dipartimento di Ingegneria Industriale, University of Rome "Tor Vergata", Via del Politecnico 1, Roma 00133, Italy, SIEGFRIED GROSSMANN, Fachbereich Physik, Philipps-Universitat Marburg, Renthof 6, D-35032 Marburg, Germany, DETLEF LOHSE, Physics of Fluids Group, Faculty of Science and Technology, University of Twente, 7500 AE Enschede, The Netherlands — The double diffusive convection (DDC) is the convection flow with the fluid density affected by two different components. In this study we numerically investigate DDC between two parallel plates with no-slip boundary conditions. The top plate has higher salinity and temperature than the lower one. Thus the flow is driven by the salinity difference and stabilised by the temperature difference. Our simulations are compared with the experiments by Hage and Tilgner (*Phys. Fluids*, vol. 22, 076603, 2010) for several sets of parameters. Reasonable agreement is achieved for the salinity flux and its dependence on the salinity Rayleigh number. For all parameters considered, salt fingers emerge and extend through the entire domain height. The thermal Rayleigh number shows minor influence on the salinity flux although it does affect the Reynolds number. We apply the Grossmann-Lohse theory for Rayleigh-Bénard flow to the current problem without introducing any new coefficients. The theory successfully predicts the salinity flux with respect to the scaling for both the numerical and experimental results.

Yantao Yang
Physics of Fluids Group, Faculty of Science and Technology,
University of Twente, 7500 AE Enschede, The Netherlands

Date submitted: 28 Jul 2014 Electronic form version 1.4