Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Gravity-capillary waves in countercurrent air/water turbulent flow[1] FRANCESCO ZONTA, TU Wien, MIGUEL ONORATO, University of Torino, ALFREDO SOLDATI, University of Udine; TU Wien — Using the Direct Numerical Simulation (DNS) of the Navier-Stokes equations, we analyze the dynamics of the interface between air and water when both phases are driven by opposite pressure gradients (countercurrent configuration). The Reynolds number (Re), the Weber number (We) and the Froude number (Fr) fully describe the physical problem. We examine the problem of the transient growth of interface waves for different combinations of physical parameters. Keeping Re constant and varying We and Fr, we show that, in the initial stages of the wave generation process, the amplitude of the interface elevation grows in time as $t^2/5$. Wavenumber spectra, $E(kx)$, of the surface elevation in the capillary range are in good agreement with the prediction of the Wave Turbulence Theory. Finally, the wave-induced modification of the average wind and current velocity profiles is addressed.

[1]CINECA supercomputing centre (Bologna, Italy) and ISCRA Computing Initiative are gratefully acknowledged for generous allowance of computer resources. Support from PRIN (under Grant 2006098584 004) is gratefully acknowledged. Support from Regione Autonoma

Francesco Zonta
TU Wien

Date submitted: 29 Jul 2016 Electronic form version 1.4