Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

The strato-rotational instability STEPHANE LE DIZES, XAVIER RIEDINGER, IRPHE, CNRS, Aix-Marseille University — The linear stability of a Taylor Couette Flow, linearly stratified in the direction of the cylinders axis with a constant Brunt-Väisälä frequency N, is analysed by asymptotical, numerical and experimental methods. The marginal stability curve in the parameter plane ($\eta = R_i/R_o; \mu = \Omega_o/\Omega_i$), where R_i and Ω_i (resp. R_o and Ω_o) are the radius and angular velocity of the inner (resp. outer) cylinder, is obtained for various Froude number $F = \Omega_i/N$ and Reynolds number $Re = \Omega_i r_i^2/\nu$. A particular attention is paid to the infinite gap limit ($\eta = 0$) for which an inviscid estimate for the critical μ for instability is derived theoretically. The instability mechanism is discussed using an asymptotical description for large axial perturbation wavenumbers. The numerical and theoretical results are compared to new experimental data obtained for large gaps.

Thomas Leweke
IRPHE, CNRS, Aix-Marseille University

Date submitted: 31 Jul 2008 Electronic form version 1.4