Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

A Zoology of unstable modes in a stratified cylinder wake MICKAEL BOSCO, PATRICE MEUNIER, None — Although the dynamics of a cylinder wake is well known and extremely rich for a homogeneous fluid, very few studies have been focused on stratified wakes despite the obvious extensive number of applications for geophysical flows and submarine wakes. The presence of the stratification may largely modify the dynamics of the wake. The study is devoted to understand the effect of the tilt and also of a strong stratification. So extensive experimental and numerical results have been investigated to describe the full dynamics of a tilted cylinder wake. For weak stratification and small tilt angle, the classical mode A found for a homogeneous fluid is still present, but for a large tilt angle, an instability appearing far from the cylinder is created. The case of a cylinder towed a very stratified fluid has been finally investigated. The dynamics is strongly modified and for moderate tilt angles, a new unstable mode appears with a structure similar to the Kelvin-Helmholtz billows (observed in the critical layer of a tilted stratified vortex), whereas for large tilt angles, another unstable mode characterized by a strong shear appears generated without a 2D von Karman structure. This reveals the rich dynamics of the cylinder wake in the presence of a stable stratification.

Mickael Bosco
None

Date submitted: 23 Jul 2013 Electronic form version 1.4