Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Helical vortices: viscous dynamics and instability[1] MAURICE ROSSI, UPMC-CNRS, CAN SELCUK, LIMSI, IVAN DELBENDE, LIMSI-CNRS, IJLRA-UPMC TEAM, LIMSI-CNRS TEAM — Understanding the dynamical properties of helical vortices is of great importance for numerous applications such as wind turbines, helicopter rotors, ship propellers. Locally these flows often display a helical symmetry: fields are invariant through combined axial translation of distance Δz and rotation of angle $\theta = \Delta z/L$ around the same z-axis, where $2\pi L$ denotes the helix pitch. A DNS code with built-in helical symmetry has been developed in order to compute viscous quasi-steady basic states with one or multiple vortices. These states will be characterized (core structure, ellipticity, ...) as a function of the pitch, without or with an axial flow component. The instability modes growing in the above base flows and their growth rates are investigated by a linearized version of the DNS code coupled to an Arnoldi procedure. This analysis is complemented by a helical thin-cored vortex filaments model.

[1]ANR HELIX

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Date submitted: 17 Jul 2014 Electronic form version 1.4