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# Laboratory experiments of transitional and turbulent Ekman layers

Joel Sommeria (1), Manikandan Mathur (1,2), and Damien Sous (3)

(1) LEGI, CNRS, Univ. Grenoble, France (joel.sommeria@legi.grenoble-inp.fr), (2) IIT Madras, Chennai, India (m.s.manikandan@gmail.com), (3) MIO, Univ. Sud Toulon Var , France (sous@univ-tln.fr)

We present well controlled laboratory experiments of the Ekman boundary layer produced by spin-up or spin-down of the 13m diameter Coriolis rotating platform at Grenoble. Both homogeneous and stably stratified cases are considered.

In the homogeneous case, each of the two branches of instabilities (type I and type II spirals) is captured in isolation by abruptly increasing the Reynolds number from 0 to a value ranging from 50 to 360. The corresponding wavelengths, orientation and growth rates are measured by Particle Image Velocimetry and compared with theory. The stable stratification tends to favour type II spirals.

In the turbulent regime the friction law is found in good agreement with the theory of the Atmospheric Boundary Layer for a smooth wall, even in the transitional regime. By contrast the angle between wall stress and geostrophic wind is observed to switch abruptly from 45 degrees (laminar) to about 30 degrees (turbulent). The influence of vertical vorticity in the geostrophic flow is discussed.