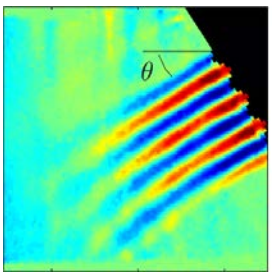
Master 1 Internship Proposal

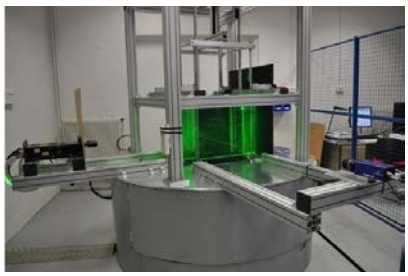
Wake of inertial waves

Fluids submitted to global rotation, as observed in geophysics and astrophysics, support the propagation of a specific class of waves, called inertial waves, which propagate in the bulk of the fluid. These anisotropic waves present remarkable features such as a phase velocity normal to their group velocity and a wavelength independent of their frequency.

In a way similar to the wake of surface gravity waves excited by the displacement of boats, an object moving in a rotating fluid will create behind him a wake of inertial waves. This wake has been described theoretically in the case of a point object. However, no quantitative measurements have been performed since then: the question of the discrepancy between these predictions and real wakes in rotating fluid, notably in relation with the finite size of the object, is still open.

We propose to perform experiments allowing to tackle this problem in a quantitative manner, using modern experimental tools. Laboratory FAST is equipped with a precision rotating platform dedicated to the study of rotating flows which allows to take a stereoscopic particle image velocimetry (PIV) system on board and therefore to measure velocity fields in the rotating frame.





Field of horizontal velocity (left) showing the propagation of a plane inertial wave excited and measured by PIV on the « Gyroflow » rotating platform of laboratoire FAST (right).

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