Capillary Wave Turbulence

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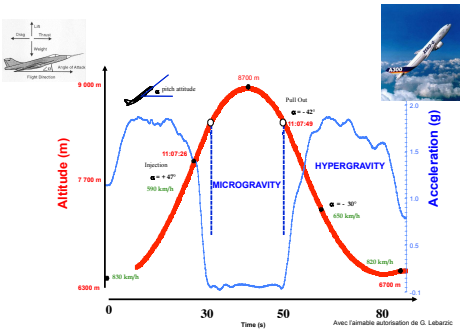
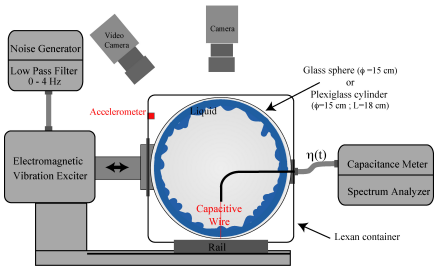
We present two experimental studies on **pure capillary wave turbulence**. Using two different experimental setups we have measured the local wave amplitude fluctuations η(t)t and computed its power spectrum density (PSD). In both cases a power-law PSD in frequency of the form f^{α} is found, where α is close to 3, depending on the symmetry of the wave system.

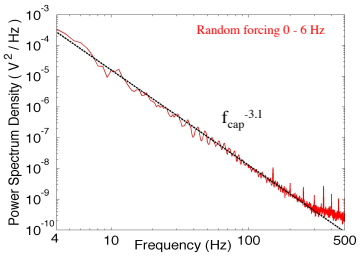


Capillary wave turbulence in Microgravity Environment

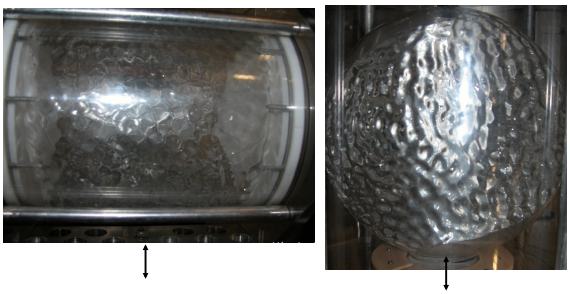
We have observed pure capillary wave turbulence at the surface of fluid layer which covers internally a sphere in a low-gravity environment[1] by measuring the local wave amplitude of the fluid surface. In order to achieve microgravity, parabolic flights have been performed in a modified Airbus Zero-G 300 of the CNES.



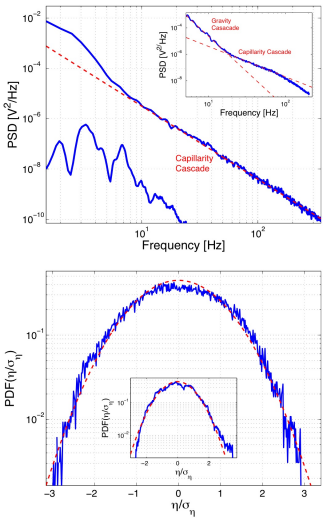
The wave turbulence regime was observed over a large wavelength band which has not been possible before, due to the existance of gravity waves that polute the spectrum.



We have also observed bi-dimensional subharmonic wave patterns (rolls, hexagons and squares) in curved surfaces by vibrating periodically the contanier. Their intrinsic dynamics is comlex resulting from the interaction of subharmonic waves and sloshing of the fluid mass.



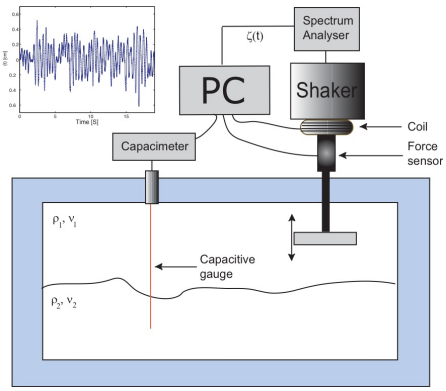
Capillary wave turbulence in Gravity Matching Environment



We have observed pure capillary wave turbulence at the interface between two incrompressible inmiscible fluids of almost equal densities[2]. In this limit, the effective gravity of the system goes to zero with the density difference.

As before, the wave turbulence regime was observed over a large wavelength band. Theoretically we have predicted a local wave amplitude power spectrum density (PSD) in frequency $f^{-8/3}$ asociated with an imposed parity symmetry.

We have also computed the probability density function (PDF) of the local wave amplitude, which shows a symmetric shape , and no exponential tails were found.



[1] C. Falcón, E. Falcon, U. Bortolozzo and S. Fauve, EPL **86** 14002 (2009).
[2] G. Düring and C. Falcón, submiitted to Phys. Rev. Lett. (2009)