

Abstract Submitted
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Turbulence close to the critical point of a fluid GAUTIER VERHILLE, CECILE LACHIZE, PATRICE LE GAL, IRPHE - Aix-Marseille univ. - CNRS — Most of experiments in turbulence deal with liquid or gas. With classical fluids it is quite difficult to have both a high Reynolds number and a Mach number high enough to have compressible effects ($Ma \gtrsim 0.3$). In water the sound speed is too large to permit compressible effects ($c \sim 1500\text{m/s}$ at room temperature and atmospheric pressure) and in air the viscosity is not so small ($\nu \sim 10^{-5}\text{m}^2/\text{s}$) so it is difficult to have high Reynolds number in a laboratory experiments. On the contrary, a fluid close to its critical point has a small kinematic viscosity, typically 20 times smaller than the water viscosity for SF6, and a small sound speed as the compressibility diverges, $c \sim 70\text{m/s}$ for SF6. Other properties of the fluid are diverging close to the critical point, as the correlation length of the density fluctuation and other goes to zero, as the thermal conductivity. We present here the first study of the modification of a turbulent flow close to the critical point. This flow is created in a rotor stator cavity, a one disk version of the “french washing machine,” in a pressurized and thermalized vessel filled up with SF6. Pressure and velocity measurements show an increase of the large scale dynamic whereas the inertial range does not seem to be affected.

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