28 janvier 2020 à 14h

Seminar Carlo Cossu

Carlo Cossu has studied at the Università La Sapienza (Roma) for his PhD . He joined from 1999 til 2009 as Chargé de recherche the <u>LadHyX</u>, at the École polytechnique. He then worked as Professor and became in 2009 Directeur de Recherche CNRS at the Institut de Mécanique des Fluides de Toulouse (IMFT).

On the self-sustained nature of Townsend's attached eddies in wall-bounded turbulent flows

More than fifty years ago Townsend proposed that the dynamics of wall-bounded turbulent flows is associated, at least statistically, to a family of coherent motions which are self-similar in the logarithmic layer. Since then, a long quest for the identification of these structures and of their dynamics has captivated generations of fluid dynamicists. For a long time the most widespread wisdom has been that Townsend's attached eddies consist of Λ-vortices, with kinetic energy produced by the smallest ones, living in the buffer layer, and then transferred to the, larger, logarithmic-layer ones and finally to the largest ones associated to large-scale (LSM) and very-large scale motions (VLSM).

In the talk I will summarize the results of ten years of investigations proposing an alternative view of the nature of Townsend's attached eddies. Evidence will be shown of the existence of a whole family of self-sustaining motions with scales ranging from those of buffer-layer streaks to those of large-scale and very-large-scale motions in the outer layer. It will be discussed how these motions, associated with streaks and quasi-streamwise vortices, are able to sustain themselves at each relevant scale in the absence of forcing from larger- or smaller-scale motions by extracting energy from the mean flow via a coherent lift-up effect .