MECHANICAL & AEROSPACE
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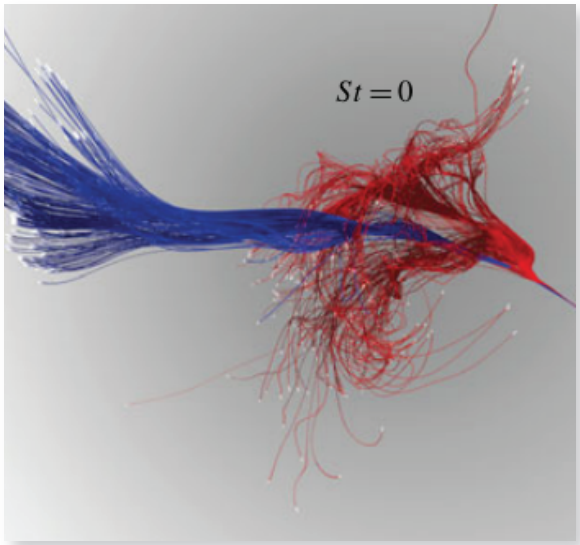

SEMINAR SERIES

FRIDAY, OCTOBER 16, 2015

MDEA, #311 ON THE UCI CAMPUS MAP

10:30AM-11:30 AM

PRESENTED BY:

PROF. FEDERICO TOSCHI

CHAIR OF COMPUTATIONAL MULTISCALE TRANSPORT PHENOMENA

DEPARTMENT OF PHYSICS, EINDHOVEN UNIVERSITY OF TECHNOLOGY, NETHERLANDS

Relative Separations of Particles in Turbulence

Turbulence has an important influence on the transport of small particulate matter like dust in the atmosphere, fuel droplets in combustion chambers and small biological organisms in marine environments. The relative separation of small particles is strongly influenced by the multi-scale space and time correlations of the turbulent velocity field. We present recent results on the dispersion of particle pairs studied by means of fully resolved high-resolution and high-statistics direct numerical simulations [1,2]. We further discuss a recently proposed sub-grid Lagrangian model capable of reproducing the effect of unresolved eddies on single tracers dynamics (absolute dispersion) as well as on their relative separation. The proposed model is simple, computationally efficient and is capable to reproduce the relative separation dynamics between pairs in a cloud composed by an arbitrary number of tracers [3].

[1] Scatamacchia, R., Biferale, L. & Toschi, F. (2012). Extreme events in the dispersions of two neighboring particles under the influence of fluid turbulence. Physical Review Letters, 109(14):144501. [2] Biferale, L., Lanotte, A.S., Scatamacchia, R. & Toschi, F. (2014). Intermittency in the relative separations of tracers and of heavy particles in turbulent flows. Journal of Fluid Mechanics, 757, 550-572. [3] Mazzitelli, I.M., Toschi, F. & Lanotte, A.S. (2014). An accurate and efficient Lagrangian sub-grid model. Physics of Fluids, 26(9), 095101-1/17.

Professor Federico Toschi holds the chair of Computational Physics of Multi-scale Transport Phenomena in the department of Physics and in the Department of Mathematics and Computer Science at Eindhoven University of Technology. The CPMTP section has recently been established within the 3TU Centre of Excellence for Multiscale Phenomena. His research interests include fluid dynamics turbulence, statistical physics, micro and nano-fluids, numerical methods for fluid dynamics, high-performance computing. The focus of his current research are multi-scale problems related to the physics of fluid studied by means of state-of-the-art computational models. He has been awarded large scale computational grants (DEISA Extreme Computing Initiative, PRACE) to study the dynamics of heavy particles in turbulence and hemodynamics.

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