Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Dynamics of the shear layers detaching from the upstream corners of an elongated rectangular cylinder MARIA VITTORIA SALVETTI, ALESSANDRO MARIOTTI, ELENA PASQUALETTO, BENEDETTO ROCCHIO, DICI, University of Pisa — The behavior and the dynamics of the shear layers detaching from a rectangular cylinder, having chord-to-depth ratio equal to 5, are investigated through highly-resolved large-eddy simulations and experimental velocity and pressure measurements. The considered configuration, which is the object of the benchmark BARC, is characterized by flow reattachment on the cylinder sides in the rear part of the body. It is shown that the mean length of the separated region, and hence the reattachment length, are correlated with the position of the maximum of the fluctuating kinetic energy along the shear-layer edge. This is in turn linked with the location at which the shear layer rolls up in Kelvin-Helmotz vortexes and hence with the shear-layer transition length. The characteristic frequencies of the shear-layer dynamics are also investigated and compared with those characterizing the vortex shedding in the body wake and the unsteady aerodynamics loads. Finally, the effects of small rounding of the upstream corners on the previously mentioned quantities and phenomena are briefly analyzed.

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Date submitted: 31 Jul 2019 Electronic form version 1.4