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**Large-scale coherent structures in fractal-generated, axisymmetric wakes** JOVAN NEDIC, OUTI SUPPONEN, Imperial College London, BHARATHRAM GANAPATHISUBRAMANI, University of Southampton, JOHN CHRISTOS VASSILICOS, Imperial College London — The coherence and energy of large-scale structures in turbulent axisymmetric wakes are known to play a role on the drag coefficient of the body. Specifically, there is an expectation that drag can be reduced by reducing the energy of the vortex shedding. We use fractal plates which have been shown to have higher drag coefficients than square plates and disks with the same frontal area (Nedic, Ganapathisubramani & Vassilicos FDR 2013), yet show that the energy of the large-scale vortices shed from these plates is reduced by 15% to 60% compared to non-fractal plates. Fractal plates can reduce wake size and alter dissipation scalings [see DFD13-2013-000126] and the relation $C_D = C_V C_{\overline{\epsilon}}$ between the drag coefficient and coefficients of wake volume and average turbulent dissipation rate can be used to explore consequences on drag. Furthermore, the azimuthal mode associated with the vortex shedding ($m = 1$) is still found to be dominant for all plates, however its coherence is slightly altered by the fractals, whilst mode $m = 2$ has been dramatically altered.

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