

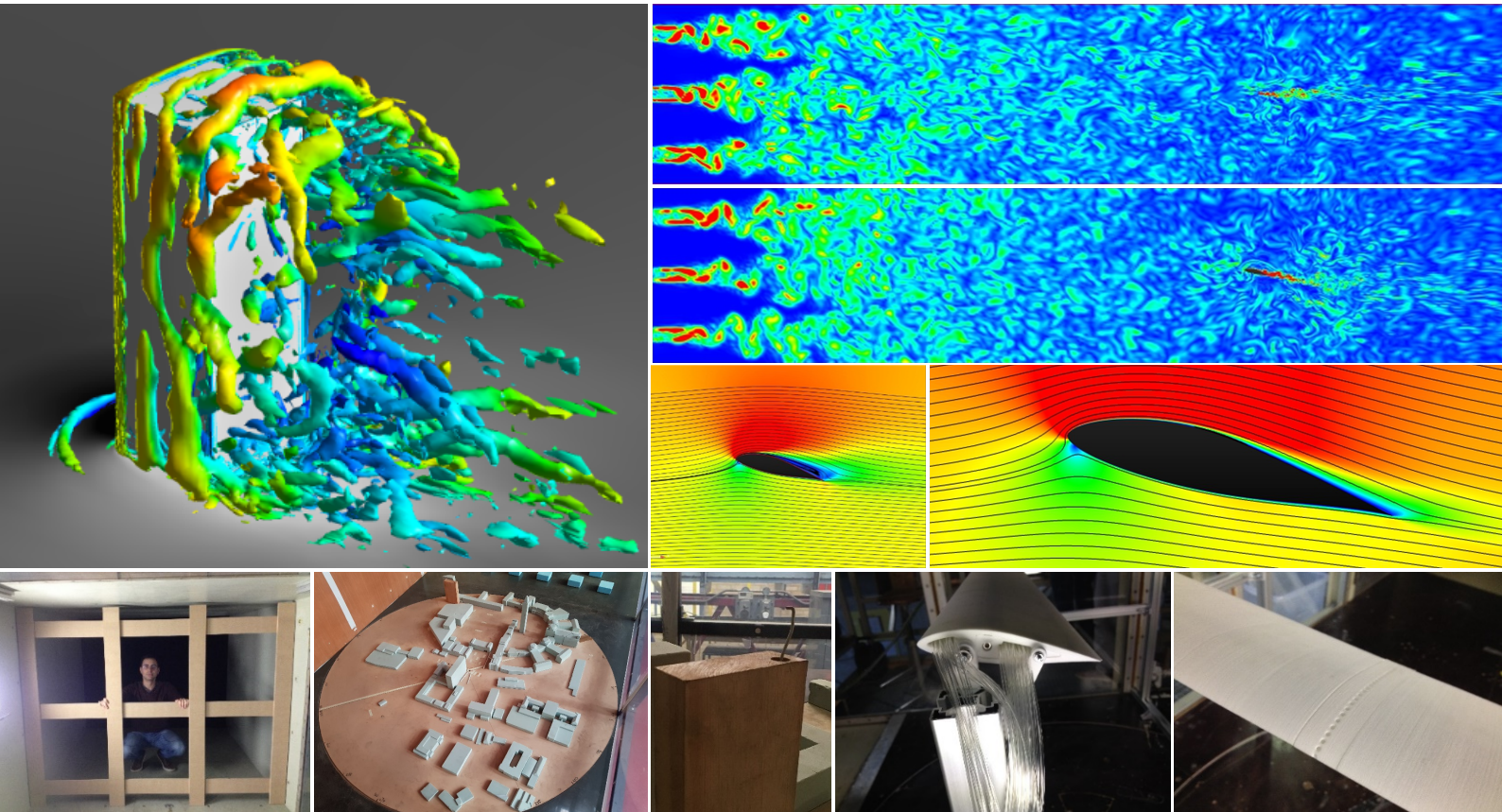


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UNIVERSITY OF
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International PhD Course
"Civil and Environmental
Engineering"



Wind Energy and the Urban Environment

The effect of turbulence in the positioning and design of wind turbines

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Ore 14,30-16,00

Aula 107

Urban Wind Energy has been around for a decade and more than electricity, it has produced damage to the image for the whole wind energy sector. This fiasco depends on our lack in understanding wind in cities, or rather understanding its highly unsteady, fluctuating, maybe chaotic, behaviour. Its turbulent behaviour.

There is no convincing technique to reproduce atmospheric turbulence for the design of wind energy converters. If experiments do not offer large possibilities for the measurement of wind speeds on scaled models, numerical techniques such as CFD mostly implement steady and simplified methods, not capable of fully encompassing turbulence characteristics.

Research conducted at the University of Birmingham and within the 'Aeolus4future' Marie Curie ITN focuses on the possibility of producing a controlled turbulent inlet in both numerical and physical simulations to investigate the behaviour of wind turbines in highly turbulent flows. The paucity of results available in literature suggests that this topic is rather challenging. But at the same time it might shed a renewed light on the design of wind energy converters and bluff bodies, which sustain a prolonged interaction with atmospheric turbulence. Results show that the role of the integral length scale of turbulence might be key in assuring the production of a highly qualitative flow field suitable for scaled experiments and simulations.



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