NWTF
NATIONAL WIND TUNNEL FACILITY
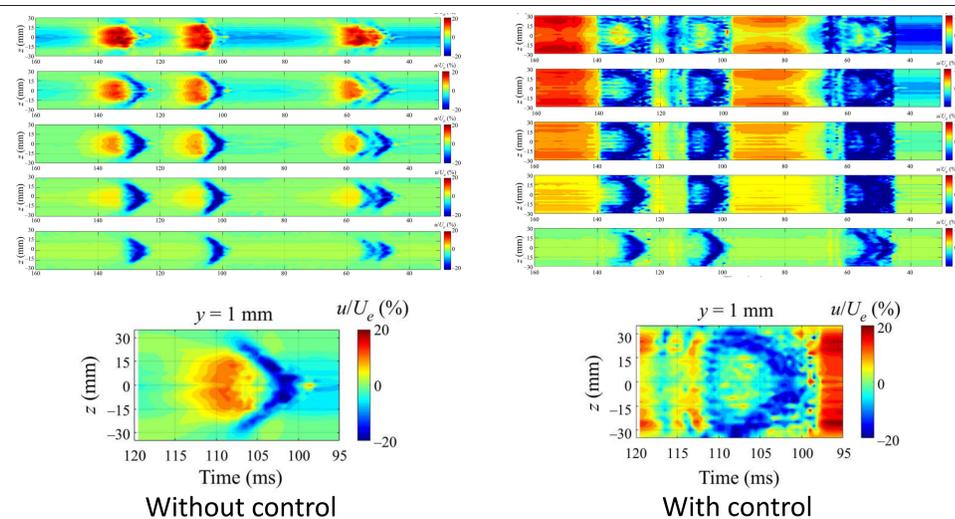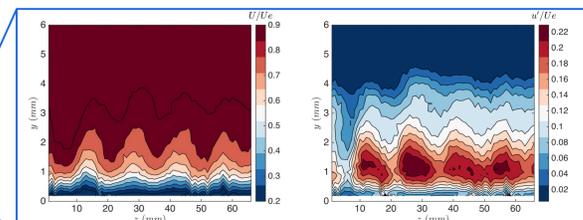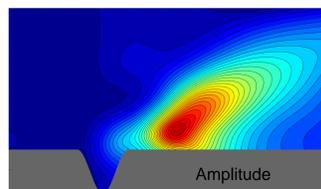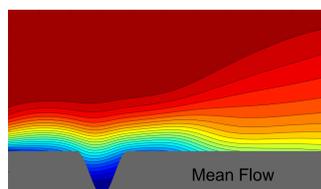
Low-Turbulence Tunnel
City, University of London

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Mean Flow

Amplitude

U/U_e

u'/U_e

$y = 1$ mm u/U_e (%)

Without control

$y = 1$ mm u/U_e (%)

With control

Stability of Boundary Layers over Uniform and Non-uniform Surfaces

- Understanding and predicting the amplification and breakdown of TS-waves due to surface non-uniformity
- Establishing criteria for surface quality for skin friction drag reduction by delaying transition
- New wing designs aim at reducing drag (i.e. fuel consumption) by promoting natural laminar flow
- The flow is dominated by crossflow vortices We study these vortices and track their growth

Deterministic Turbulence (with U. Nottingham)

- Unlike "ordinary" turbulence, the deterministic turbulence method allows prediction of exact time and location of turbulence events that take place in the flow – only possible to study in very low turbulence facilities
- This is used to investigate & control transitional boundary layers for drag reduction by modifying turbulent spots
- Opposition-control strategy employed was a combination of out-of-phase v-velocity control with in-phase u-velocity control
- The effectiveness of opposition control in cancelling the high-speed region of the turbulent spots was demonstrated
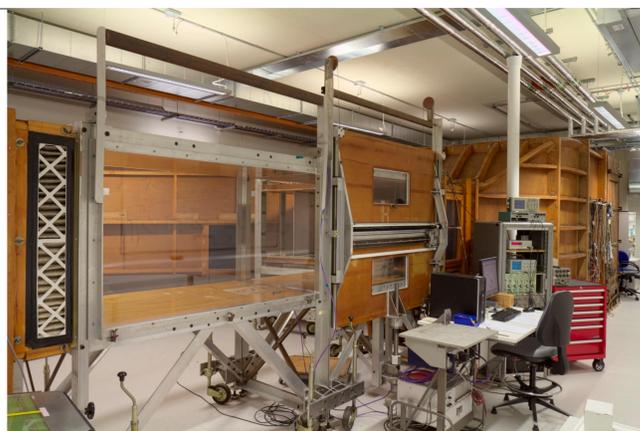
Gaster Low-Turbulence Tunnel

- Test Section Dimensions: 0.9m X 0.9m X 3m
- Maximum Velocity: 30m/s
- Freestream Turbulence Intensity: 0.007 %
- Instrumentation: Thermal Anemometry, Pressure & Acoustic Transducers

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