Abstract Submitted
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Characterisation of turbulence downstream of a linear compressor cascade[1] LUCA DI MARE, Imperial College London, THOMAS JELLY, IVOR DAY, University of Cambridge — Characterisation of turbulence in turbomachinery remains one of the most complex tasks in fluid mechanics. In addition, current closure models required for Reynolds-averaged Navier-Stokes computations do not accurately represent the action of turbulent forces against the mean flow. Therefore, the statistical properties of turbulence in turbomachinery are of significant interest. In the current work, single- and two-point hot-wire measurements have been acquired downstream of a linear compressor cascade in order to examine the properties of large-scale turbulent structures and to assess how they affect turbulent momentum and energy transfer in compressor passages. The cascade has seven controlled diffusion which are representative of high-pressure stator blades found in turbofan engines. Blade chord, thickness and camber are 0.1515 m, 9.3% and 42 degrees, respectively. Measurements were acquired at a chord Reynolds number of 6.92×10^5. Single-point statistics highlight differences in turbulence structure when comparing mid-span and end-wall regions. Evaluation of two-point correlations and their corresponding spectra reveal the length-scales of the energy-bearing eddies in the cascade. Ultimately, these measurements can be used to calibrate future computational models.

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