Abstract Submitted
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Flow structure interaction between a flexible cantilever beam and isotropic turbulence[1] ANDREW VOGEL, Columbia University, THOMAS MORVAN, Universit de Nantes, OLEG GOUSHCHA, YIANNIS ANDREOPOULOS, NIELL ELVIN, The City College of New York — In the present experimental work we consider the degree of distortion of isotropy and homogeneity of grid turbulence caused by the presence of a thin flexible cantilever beam immersed in the flow aligned in the longitudinal direction. Beams of various rigidities and lengths were used in the experiments. Piezoelectric patches were attached to the beams which provided an output voltage proportional to the strain and therefore proportional to the beam's deflection. The experiments were carried out in a large scale wind tunnel and hot-wires were used to measure turbulence intensity in the vicinity of the beams for various values of the ratio of aerodynamic loading to beam's rigidity. It was found that the flow field distortion depends on the rigidity of the beam. For very rigid beams this distortion is of the order of the boundary layer thickness developing over the beam while for very flexible beams the distorted region is of the order of the beam's tip deflection. Analysis of the time-dependent signals indicated some correlation between the frequency of beam's vibration and flow structures detected.

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