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Control of the Near-Wake of a Forced-Oscillating Cylinder via a Straight Surface Wire TAYFUN AYDIN, VEITCH THOMAS, ALIS EKMEKCI, University of Toronto — Effects of a spanwise surface wire on the near-wake of a circular cylinder subjected to small-amplitude, forced- oscillation at the inherent Karman frequency are studied via Particle Image Velocimetry (PIV). The Reynolds number is 10,000 and the diameter of the surface wire is two orders of magnitude smaller than the cylinder diameter, but larger than the unperturbed boundary layer thickness prior to its separation. The near wake is markedly affected by the wire when it is located within a certain range of angular positions with respect to the approach flow. As the angular position is altered, the near wake undergoes a contraction, followed by an extension in the streamwise direction. This trend is in the reverse order of what has been reported for a stationary cylinder. The predominant frequency of the velocity fluctuations in the separating shear layers locks onto the frequency of the forced oscillation and remains unchanged with the angular position of the wire. However, the predominant frequency in the near wake shows a gradual decrease, then increase, as the angular position of the wire is increased within the defined range of angles.

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