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Modification of three-dimensional transition in bluff-body wakes DAVID LO JACONO, JUSTIN LEONTINI, MARK THOMPSON, JOHN SHERIDAN, Monash University — A study of the flow past an oscillatory-rotating cylinder has been conducted, where the frequency of oscillation has been matched to the natural frequency of the vortex street generated in the wake of a stationary cylinder, for Reynolds number (Re = 300). Using Floquet stability analysis, it was found that the fine-scale three-dimensional mode that typically dominates the wake as Re is increased beyond that at transition to three-dimensional flow (referred to as mode B) was suppressed for amplitudes of rotation beyond a critical amplitude, confirming past studies. However, the rotation did not suppress the three-dimensional transition completely, as other modes were discovered that would lead to three-dimensional flow. In particular, the longer-wavelength mode that leads the three-dimensional transition in the wake of a stationary cylinder (referred to as mode A) was left essentially unaffected at low amplitudes of rotation. At higher amplitudes of oscillation, mode A was also suppressed, however other modes were predicted to render the flow three-dimensional, one of these modes appearing to be a spatial harmonic of mode A.

[X] Prefer Oral Session
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