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Vortex Shedding Dynamics for Nonparallel Tandem Cylinders[1]
DIANA SHER, SEAN BLANEY, PHILIPPE LAVOIE, University of Toronto —
Nonparallel tandem cylinder geometries are found in many industrial applications. This type of geometry can lead to significant flow induced vibration and noise emissions. However, the flow dynamics is not well understood since this geometry has not received as much attention as isolated or parallel tandem cylinders. This work considers an upstream circular cylinder perpendicular to the flow and a yawed downstream cylinder. Measurements were conducted in an open jet anechoic wind tunnel (AWT) at UTIAS. Yaw angles up to 45° over a range of Re = 40,000 120,000 were tested. The vortex shedding behavior along the span of the cylinders was investigated using surface pressure measurements. Peak patterns observed in the spectra indicate the presence of spanwise-dependent flow cells. A single dominant peak in the frequency spectrum exists where the spacing between the cylinders is narrow, two prominent peaks appear at intermediate spacings, and at locations where the spacing is wide, a single peak is present. There are two distinct shedding frequencies at which these peaks occur for each yaw angle, suggesting the existence of two flow cells. The shedding frequency increases for larger yaw angles independently of Re, with the lower frequency peak exhibiting a larger shift.

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Philippe Lavoie
University of Toronto

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