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**Two-dimensional wakes of a variable diameter cylinder** WENCHAO YANG, MARK STREMLER, Virginia Tech — It is well known that periodic variations in the position of a circular cylinder can produce a variety of complex vortex wake patterns. We will discuss what we believe is the first investigation of the wake patterns produced by a stationary circular cylinder undergoing periodic variations in the cylinder diameter. In our experiments, cylinder variations are produced by oscillating a cone perpendicularly through a flowing soap film. The wake flow generates thickness variations in the thin soap film, allowing direct observation of wake patterns through visualization of interference fringes. We consider diameter variations ranging from 0.1 to 0.5 times the mean diameter, with the Reynolds number varying from 50 to 150. The frequency of the diameter's variation influences the wake patterns. When the variation frequency is negligible compared to the vortex shedding frequency, the wake is a quasi-steady representation of fixed cylinder shedding. We will discuss wake pattern bifurcations that occur as the variation frequency becomes comparable to the vortex shedding frequency. Comparisons will be made with the wake patterns generated by a constant-diameter circular cylinder forced to oscillate transverse to the free stream.

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