

# VAWT in a falling soap film

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Stationary VAWT:  $Re_c \approx 3000$ ,  $TSR = 0$



Rotating VAWT:  $Re_c \approx 3000$ ,  $TSR \approx 1.04$

Vertical axis wind turbines (VAWTs) exhibit complex aerodynamics including dynamic stall and periodic blade-wake interactions. Motivated by a desire to develop intuition about the flow, we constructed an experiment using a 3-bladed VAWT in a falling soap film. The chord Reynolds number,  $Re_c$ , and tip speed ratio (blade speed/freestream speed),  $TSR$ , for the flow are given above. We observe a broad range of scales present in the wake, from small scale periodic blade shedding to the development of large scale vortical structures in the far wake. These large structures are thought to be the result of a developing wake instability. These qualitative observations of the wake dynamics are supported by a more detailed analysis of velocity spectra from PIV measurements in larger scale VAWT experiments at Caltech.

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