VIV in 60 Seconds

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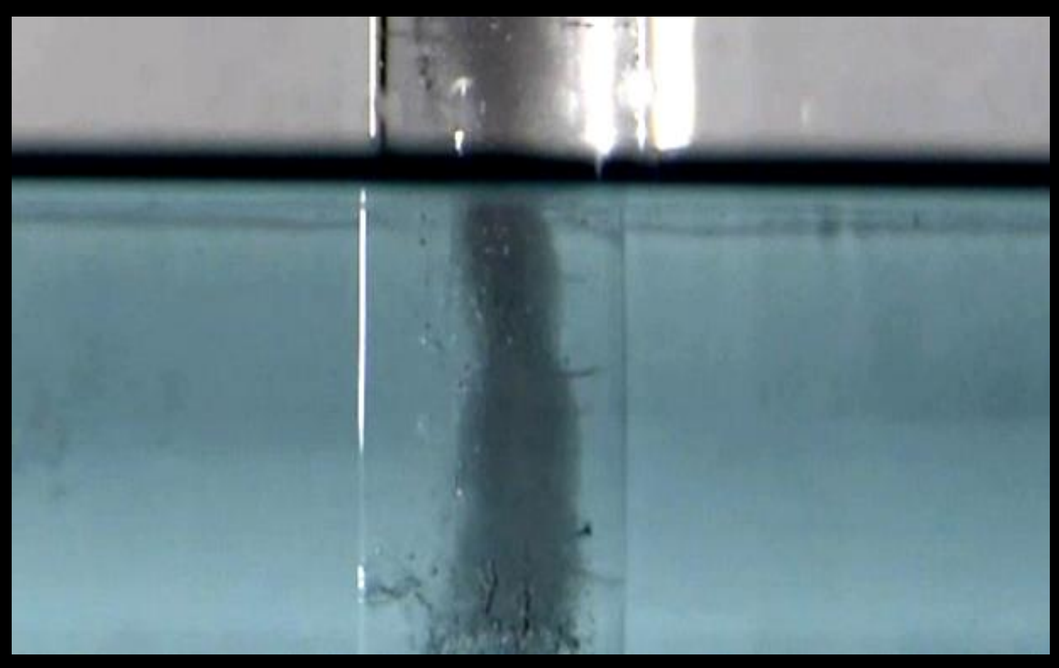
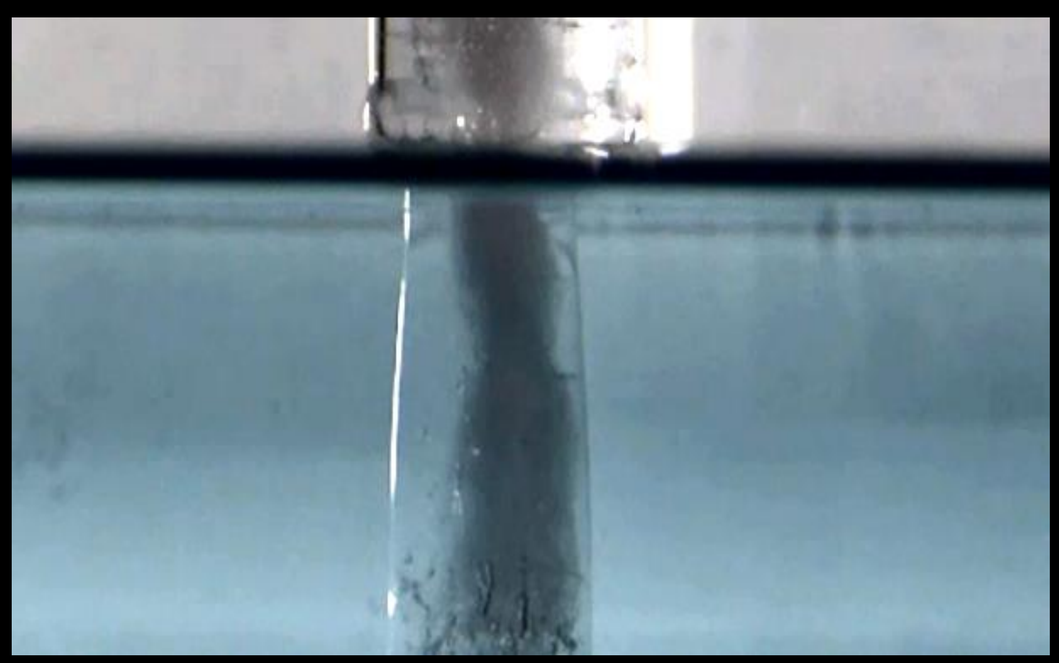
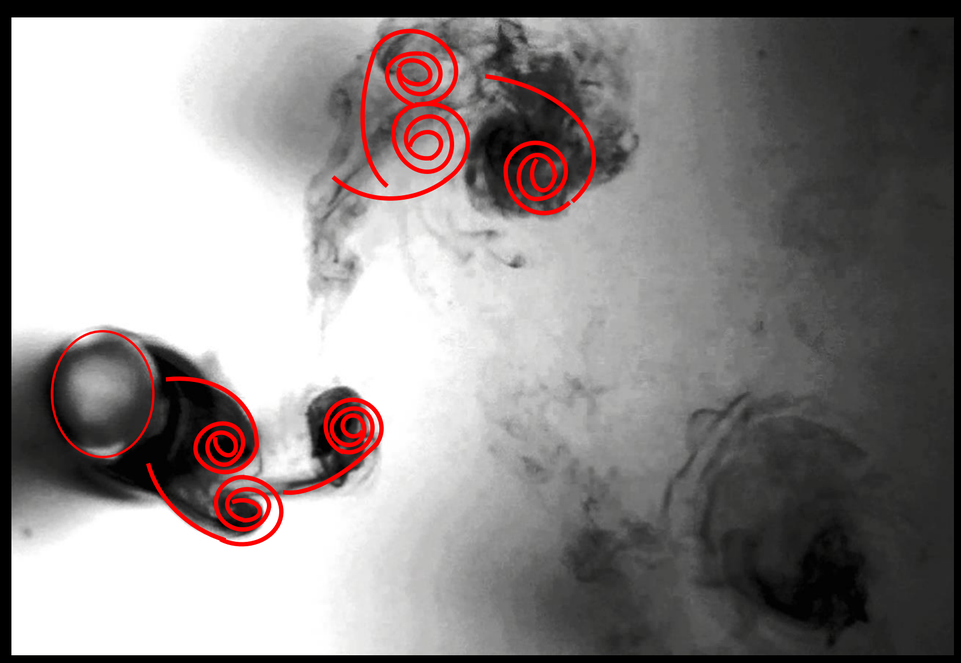
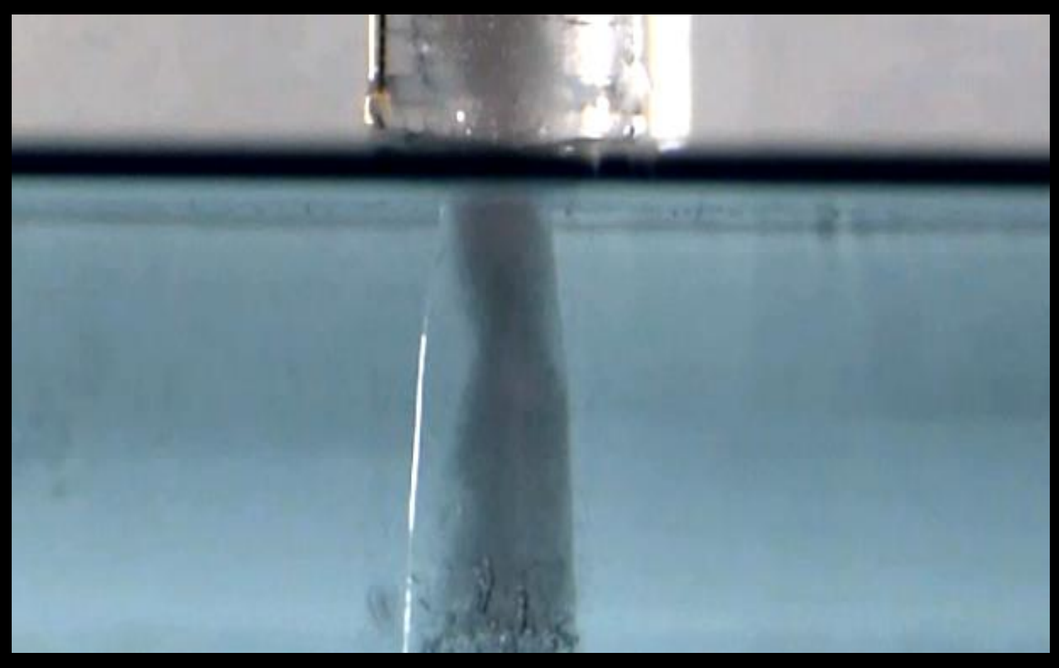
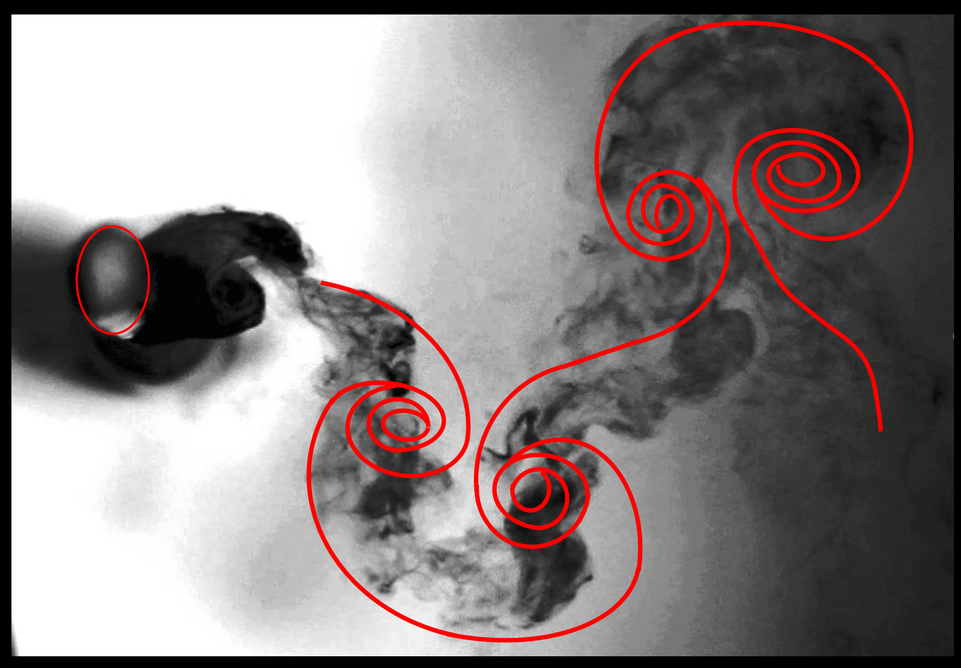
We are looking at Vortex-Induced Vibration (VIV) of a circular cylinder made of ice as it melts in water flow. In classical VIV tests, the cylinder has a constant diameter and the reduced velocity (a dimensionless flow velocity) is varied by changing the flow velocity to cover the lock-in range (the range of large-amplitude oscillations). Here, instead of the flow velocity, it is the change in cylinder's diameter, which changes the reduced velocity. It only takes 60 seconds to cover the entire lock-in range.

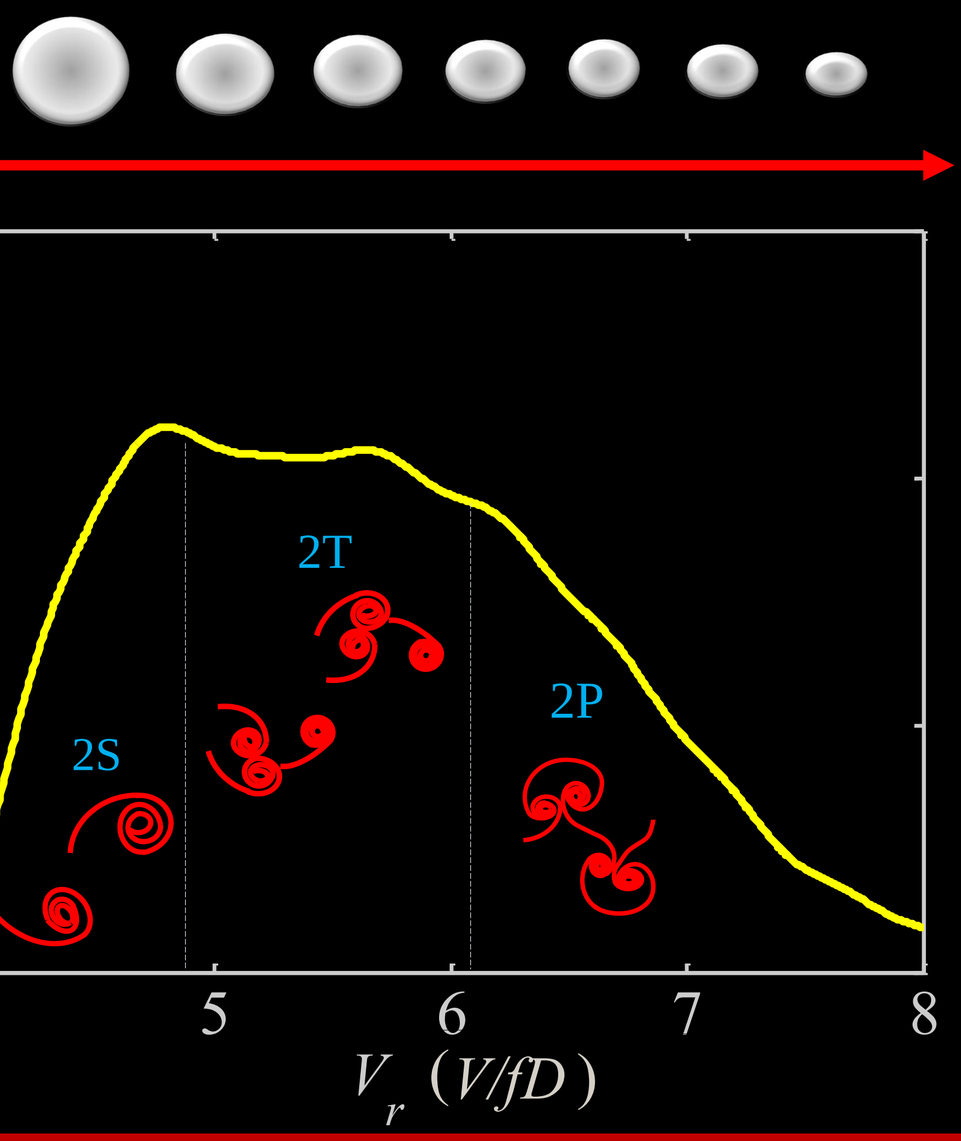












In time the cross-section becomes elliptical and the shedding pattern changes:

When the cylinder starts oscillating, a typical von Karman street is observed (2 Single vortices are shed in each cycle).

After some time, as the cylinder melts and its cross-section becomes elliptical, large-amplitude oscillations and 2T shedding are observed (2 Triplets are shed in each cycle).

As time passes and the elliptical cross-section becomes even smaller, small-amplitude oscillations and 2P vortices are observed (2 Pairs of vortices are shed in each cycle) .