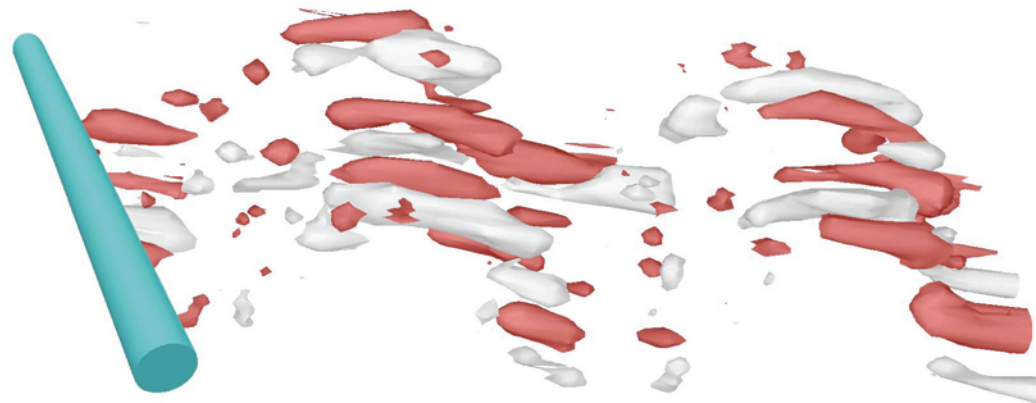


Vortex Lock-on and Spatio-temporal Evolutions of Streamwise Vortices

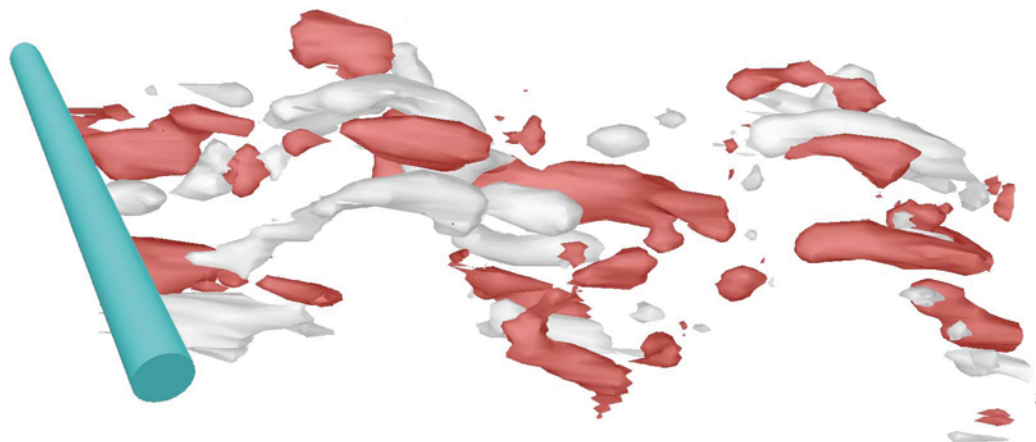
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Natural shedding case, $f_o/f_n = 0$



Lock-on state, $f_o/f_n = 1.92$

These figures show the spatio-temporal representations of iso-vorticity surfaces of the streamwise vortices in the natural shedding and lock-on conditions. Successive PIV images were acquired in the streamwise plane which was located at 2.5 diameters downstream of a circular cylinder, by utilizing an image-reflecting mirror oriented at 45° far downstream. The streamwise coordinate is proportional to time. When a bluff body faces an oscillatory incident flow, a vortex lock-on may occur accompanied with an increase in fluctuating lift and drag forces. Furthermore, the present results strongly manifest the increased strength and spanwise wavelength of the streamwise vortices with lock-on.