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Transportation of a Dye in Upstream and Downstream Wakes of the Cylinder in Continuously Stratified Liquid

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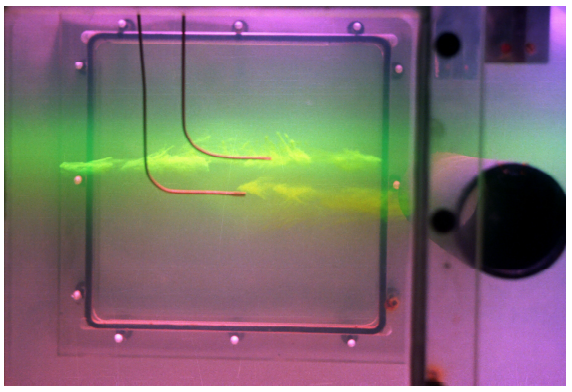
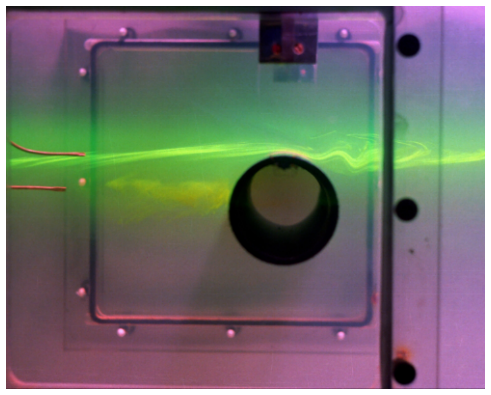
Redistribution of the dye: $D = 7.6$ cm; $T_b = 7.1$ s; $U = 0.24$ cm/s; Fr $= 0.035$; Re $= 180$;

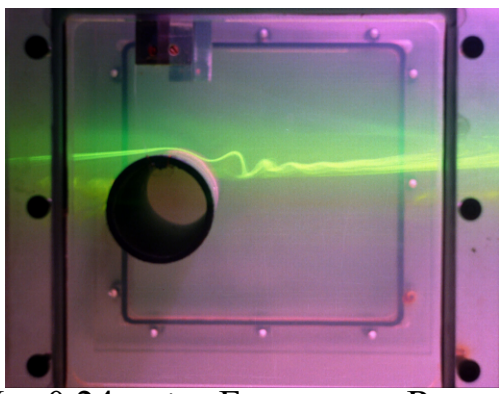


$t = 0$ s



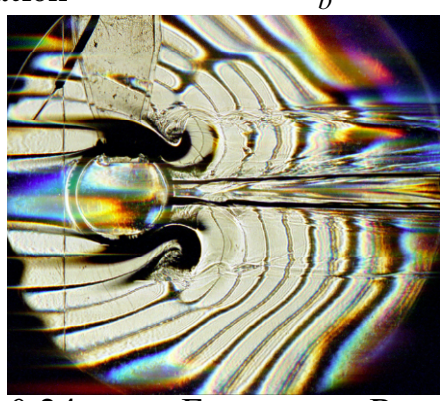
$t = 55$ s

$D = 7.6$ cm; $T_b = 7.1$ s; Dye and schlieren visualization $D = 5.0$ cm; $T_b = 7.4$ s;

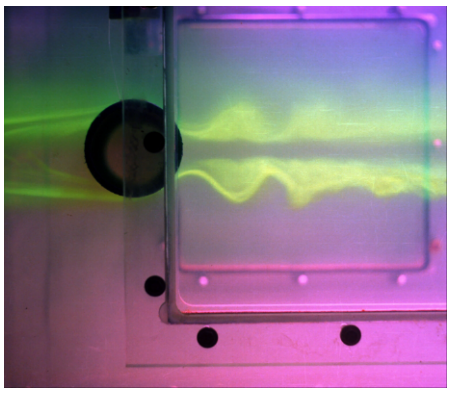


$t = 110$ s

$U = 0.24$ cm/s; Fr $= 0.035$; Re $= 180$;

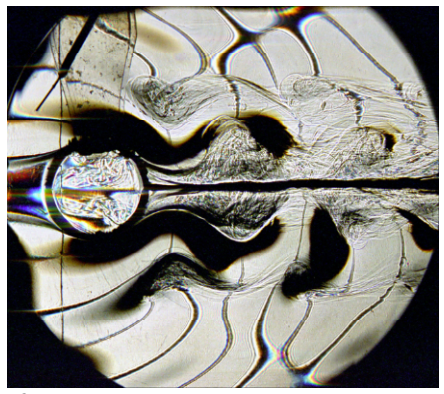


$U = 0.24$ cm/s; Fr $= 0.056$; Re $= 119$;



$t = 60$ s

$U = 0.69$ cm/s; Fr $= 0.103$; Re $= 524$;



$U = 0.55$ cm/s; Fr $= 0.129$; Re $= 273$;

Evolution of the dye patterns around horizontal cylinder moving from right to left in continuously stratified liquid with buoyancy frequency $N = 2\pi/T_b$. After beginning of the motion part of unchanged cloud of the dye is transported along with the blocked fluid. Part of the dye is accumulated in bright strips coinciding with high-gradient interfaces in schlieren images of the similar undyed flows. U and D are, respectively, velocity and diameter of the cylinder, t is duration of the body motion, $\mathrm{Re} = UD/\nu$ and $\mathrm{Fr} = U/ND$, are Reynolds and internal Froude numbers.

Reference : Chashechkin, Yu. D. and Mitkin, V. V. Soaring interfaces vortices and vortex systems inside the internal waves wake past the horizontally moving cylinder in a continuously stratified fluid, J. of Visualization, 9-3 (2006), 301-308.