

Movie 1: Modal fluctuations from DMD mode  $\phi_1$ . (a) The animation shows the isosurfaces of the streamwise velocity fluctuations and the contours of the pressure fluctuations on slice  $z/\delta_0 = -8.0$  at 32 phase angles (red:  $u'/u_\infty = 0.42$  and blue:  $u'/u_\infty = -0.42$ ). (b) The animation shows the isosurfaces of the pressure fluctuations at 32 phase angles (red:  $p'/p_\infty = 0.02$  and blue:  $p'/p_\infty = -0.02$ ).

Movie 2: Modal fluctuations from DMD mode  $\phi_2$ . The animation shows the isosurfaces of the streamwise velocity fluctuations and the contours of the pressure fluctuations on slice  $z/\delta_0 = -8.0$  at 32 phase angles (red:  $u'/u_\infty = 0.3$  and blue:  $u'/u_\infty = -0.3$ ).

Movie 3: Modal fluctuations from DMD mode  $\phi_3$ . The animation shows the isosurfaces of the streamwise velocity fluctuations and the contours of the pressure fluctuations on slice  $z/\delta_0 = -8.0$  at 32 phase angles (red:  $u'/u_\infty = 0.06$  and blue:  $u'/u_\infty = -0.06$ ).