Movies 1 – 7: In these movies, we show the temporal evolution of streamwise velocity deviation of the P1, P3, and P4 travelling wave solutions in the y-z plane during one period. All solutions are at Re\_c = 1800, except for the P4 subharmonic solutions, which is shown at Re\_c = 3600. The fundamental domain size is different: [π,2,π] for P1, [2π,2,π] for P3 and P4 subharmonic branch, and [π,2,π/2] for P4. The black line represents the critical layer, where the local streamwise velocity matches the wave speed. As explained by our analysis, P1 and P3 lower branch solutions (movie 1 and 3) exhibit relatively strong velocity deviation near the channel center, which may be called core modes. The P4 solutions (movie 5, 6 and 7) show strong deviations around the critical layer, which may be called critical layer modes.

Movie 1: P1 lower branch solution

Movie 2: P1 upper branch solution

Movie 3: P3 lower branch solution

Movie 4: P3 upper branch solution

Movie 5: P4 lower branch solution

Movie 6: P4 upper branch solution

Movie 7: P4 subharmonic branch solution

Movies 8 – 17: In these movies, we show the temporal evolution of streamwise velocity of the travelling wave solutions in the y-z plane during one period. All solutions are at Re\_c = 1800, except for the P4 subharmonic and P5 solutions, which are shown at Re\_c = 3600. The fundamental domain size is different: [π,2,π] for P1 and P2, [2π,2,π] for P3 and P4 subharmonic branch, and [π,2,π/2] for P4 and P5. The black line represents the critical layer, where the local streamwise velocity matches the wave speed. Wall-normal and spanwise velocities are shown by arrows. Note that the scale of arrows is same for all movies.

Movie 8: P1 lower branch solution

Movie 9: P1 upper branch solution

Movie 10: P2 solution

Movie 11: P3 lower branch solution

Movie 12: P3 upper branch solution

Movie 13: P4 lower branch solution

Movie 14: P4 upper branch solution

Movie 15: P4 subharmonic branch solution

Movie 16: P5 lower branch solution

Movie 17: P5 upper branch solution