

Abstract Submitted
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New exact coherent states in plane Poiseuille flow MASATO NAGATA, KENGO DEGUCHI, Kyoto University — Two new classes of traveling wave solution are found in plane Poiseuille flow by continuing the stationary and traveling hairpin vortex states in plane Couette flow. One of them, referred to as MS hereafter, arises from a saddle-node bifurcation, characterized by two planes of mirror-symmetry perpendicular to the span-wise direction. The second new class solution, referred to as AS hereafter, bifurcates by breaking the mid-plane symmetry of the first class. Both MS and AS are characterized by two quasi-stream-wise low-speed streaks within one span-wise period. The low-speed streaks are aligned with the vertical planes of mirror symmetry, with their width varying in a varicose fashion in the stream-wise direction. These streaks appear close to both top and bottom channel walls for MS, and to only one of the channel walls for AS. We find that the Reynolds numbers at the saddle-node bifurcation for MS and AS are smaller than that of the exact coherent state in plane Poiseuille flow known to date found by Waleffe (2003).

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