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The moving wall effects on structures in turbulent Couette-Poiseuille flows[1] JUN HYUK HWANG, JAE HWA LEE, UNIST — Direct numerical simulation of a turbulent Couette-Poiseuille flow (hereafter, CP-flow) is performed to investigate spatial development of turbulent structures in the asymmetric flows between two parallel planes. The asymmetric CP-flows are generated by imposing the constant moving wall velocity condition on the top wall in the opposite direction to the main flow, and the velocity is varied systematically. As the moving wall velocity increases, the friction Reynolds number on the moving wall increases largely, although it is increased slightly on the stationary wall. Inner-scaled mean velocity profiles show that the logarithmic layer is established clearly on the moving wall, whereas it is shortened on the stationary wall compared to that from turbulent pure Poiseuille flow at similar Reynolds number. Profiles of the turbulent intensities show that the turbulent activity increases/decreases near the moving/stationary wall with an increase of the moving wall velocity The asymmetric features of the CP-flow are mainly attributed to significant growth of near-wall motions on the top wall throughout the elongated shear layer.

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