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Structural organization of uniform momentum core in turbulent channel flow[1] JONGMIN YANG, JINYUL HWANG, HYUNG JIN SUNG, Korea Adv Inst of Sci & Tech — The coherent structures across the boundary of the quiescent core region are explored using the direct numerical simulation data of a turbulent channel flow at Re_τ =930. The quiescent core is the region where the streamwise momentum is relatively uniform with low-level turbulence in channel flow. Across the boundary of this region, the turbulence intensity and the Reynolds shear stress decrease suddenly. The mean velocity profile shows a significant jump which indicates a strong mean shear layer at the boundary of the uniform core region. Due to the strong mean shear, the prograde vortices are dominantly distributed along the boundary with the retrograde vortices below them. The prograde and retrograde vortices are distributed in a pair with a uniform wall-normal distance. Large-scale low- and high-speed structures are characterized by the positions of the core boundary, revealing that the core boundary is modulated by the large-scale structures.

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Jongmin Yang
Korea Adv Inst of Sci & Tech

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