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Puff-like Structures Captured in DNS of the Turbulent Poiseuille Flow at Low Reynolds Numbers[1] TAKAHIRO TSUKAHARA, Dept. Mech. Eng., Tokyo University of Science, KAORU IWAMOTO, HIROSHI KAWAMURA, Dept. Mech. Eng., Tokyo University of Science, DAISUKE TOCHIO, Dept. HTTR Project, Japan Atomic Energy Research Institute — Direct numerical simulation (DNS) of a fully developed turbulent channel flow for very low Reynods numbers has been executed with larger computational box-sizes than those of common DNS. The present Reynolds number is decreased down to Re_τ=64, where Re_τ is based on the friction velocity and the channel half width δ. For lower Reynolds numbers of $Re_\tau \leq 80$ with the largest box of $51.2\delta \times 2\delta \times 22.5\delta$, the periodic weak-turbulence regions are observed. This type of locally disordered flow is similar to a turbulent puff observed in a transitional pipe flow. The equilibrium puff-like structures observed in the channel flow incline against the streamwise direction. The propagation velocity of the puff-like structure is approximately equal to the bulk mean velocity. The significant effects of the captured puff-like structures exist upon the turbulence statistics, such as a mean velocity and turbulence intensities.

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