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Direct numerical simulation for turbulent channel flow at high Reynolds number[1] MYOUNGKYU LEE, NICHOLAS MALAYA, ROBERT D. MOSER, University of Texas at Austin — Direct numerical simulation (DNS) is a powerful tool in the study of wall-bounded turbulent flows. Of particular focus is the scaling of flow statistics with respect to Reynolds number. Investigations of these scalings require data at higher Reynolds numbers, which is limited by available computational power. We have developed a new codebase, optimized for Petascale machines, in order to perform a DNS at higher Reynolds number ($Re_\tau \approx 5000$) than previously performed. We simulate a canonical channel flow, with two infinite parallel plates driven by a constant pressure gradient. The numerical scheme is a Fourier spectral representation in the streamwise and spanwise directions, with B-Splines in the inhomogeneous direction. We demonstrate agreement between this code and previous DNS results at lower Reynolds numbers. Finally, we present some preliminary statistics including the mean velocity profile and the intensity of the fluctuations.

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