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Comparing experimental and Direct Numerical Simulation results from a turbulent channel flow JASON MONTY, MIN CHONG, The University of Melbourne — Remarkable progress has been made in the direct numerical simulation (DNS) of wall-bounded turbulence; particularly of turbulent channel flow, with numerical data now available above $Re_\tau \approx 2000$. Yet there are only very limited comparisons with experimental data in the literature. As such, this investigation compares a well-documented, high Reynolds number ($Re_\tau = 934$), large box size DNS from Del Alamo, Jimenez, Zandonade & Moser (JFM, 2004) and laboratory channel flow data measured by the authors. Results show excellent agreement of streamwise velocity statistics. The spectra are also very similar, however, throughout the logarithmic region the secondary peak in energy is significantly reduced in the DNS results. Since the wavelengths associated with the energy difference are close to the DNS box length, it is recommended that longer box lengths should be investigated. Another spectral discrepancy results from an incorrect convection velocity when using Taylor's hypothesis for the temporal laboratory data. A convection velocity modification function is tentatively proposed giving good agreement between the data sets.

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