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Reynolds number effects on scale energy analysis of turbulent boundary layers[1] NEELAKANTAN SAIKRISHNAN, ELLEN LONGMIRE, University of Minnesota Twin Cities, IVAN MARUSIC, University of Melbourne — Scale energy analysis combines two approaches of studying wall- bounded turbulent flows - analysis in physical space and analysis in scale space. Previously, scale energy analysis has been performed on DNS channel flow data for a range of friction Reynolds numbers $\mathrm{Re}_\tau = 180 - 934$ and dual plane PIV boundary layer data at $\mathrm{Re}_\tau = 1100$. The dual plane technique allows determination of the full velocity gradient tensor in the measurement plane. Dual Plane PIV data were acquired in streamwise-spanwise planes in the logarithmic region of a water channel boundary layer at two higher Reynolds numbers - $\mathrm{Re}_\tau = 2400$ and 3000. The results of this study will be described and compared with the lower Re data. It is observed that in general, the production and scale transfer terms of the turbulent kinetic energy increase with increasing Reynolds number. The cross-over scale, which divides the range of scales into a transfer-dominated region and a production- dominated region, increases with increasing Reynolds numbers, resulting in a larger range of transfer-dominated scales at higher Reynolds numbers.

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