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Temperature fluctuations in fully-developed turbulent channel flow with heated upper wall CARLA BAHRI, MICHAEL MUELLER, MARCUS HULTMARK, Princeton University — The interactions and scaling differences between the velocity field and temperature field in a wall-bounded turbulent flow are investigated. In particular, a fully developed turbulent channel flow perturbed by a step change in the wall temperature is considered with a focus on the details of the developing thermal boundary layer. For this specific study, temperature acts as a passive scalar, having no dynamical effect on the flow. A combination of experimental investigation and direct numerical simulation (DNS) is presented. Velocity and temperature data are acquired with high accuracy where, the flow is allowed to reach a fully-developed state before encountering a heated upper wall at constant temperature. The experimental data is compared with DNS data where simulations of the same configuration are conducted.

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