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The role of large scale motions on passive scalar transport SURANGA DHARMARATHNE, GUILLERMO ARAYA, Texas Tech University, MURAT TUTKUN, Institute for Energy Technology, Norway, STEFANO LEONARDI, University of Texas at Dallas, LUCIANO CASTILLO, Texas Tech University — We study direct numerical simulation (DNS) of turbulent channel flow at $\mathrm{Re}_\tau = 394$ to investigate effect of large scale motions on fluctuating temperature field which forms a passive scalar field. Statistical description of the large scale features of the turbulent channel flow is obtained using two-point correlations of velocity components. Two-point correlations of fluctuating temperature field is also examined in order to identify possible similarities between velocity and temperature fields. The two-point cross-correlations betwen the velocity and temperature fluctuations are further analyzed to establish connections between these two fields. In addition, we use proper orhtogonal decompotion (POD) to extract most dominant modes of the fields and discuss the coupling of large scale features of turbulence and the temperature field.

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