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Flow and turbulence structure in a shallow mixing layer developing over a flat surface at high Reynolds numbers GOKHAN KIRKIL, Kadir Has University — Results of a high resolution Detached Eddy Simulation (DES) are used to characterize the evolution of a shallow mixing layer developing between two parallel streams in a long open channel with a flat surface at a high Reynolds number (Re=250,000). The study discusses the influence of Reynolds number on the development of the mixing layer as well as the vertical non-uniformity in the mixing layer structure and provides a quantitative characterization of the growth of the large-scale coherent structures with the distance from the splitter plate. Mixing layer growth rate and its change in the vertical direction are compared with experiments and a simulation at Re=16,000. Power spectra of the horizontal velocity components are examined for the presence of a -3 and -5/3 subranges at streamwise locations away from the splitter plate. Passive scalar is introduced at the tip of the splitter plate close to the free surface to estimate the size of the mixing structures based on mass transport. The effect of the Reynolds number on the shift of the centerline of the mixing layer is quantified.

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