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DNS analysis of flame propagation for systematic variations in turbulence scales and intensity SHREY TRIVEDI, R. STEWART CANT, University of Cambridge — Direct Numerical Simulation (DNS) of premixed hydrocarbon flames is performed using the DNS code Senga2 to investigate the role of varying integral length scale l_0 as well as the turbulence intensity u‘ in the thin reaction zone regime. Different cases are studied by either systematically varying l_0 at constant u‘ or by systematically varying u‘ at constantl_0. Several aspects of these flames are compared. The turbulent flame speed s_T is found to decrease as l_0 decreases or when u‘ increases. The ratio of s_T/s_L is generally accounted for by the area change A_T/A_L but a significant deviation is observed between these values at high u‘ cases. The size of the smallest scales of turbulence also decreases with l_0 and the interaction of these small scales with the flame produces an increase in the mean curvature of the flame which eventually reaches a saturation point. There is also an increase in the number of flame-flame interactions with decreasing l_0. Individual flame-flame interaction topologies are identified and analysed. All these findings serve to further our understanding of turbulent combustion and the role that the turbulence length scales play in flame propagation.

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