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The evolution of the flame surface in turbulent premixed jet flames at high Reynolds number STEFANO LUCA, King Abdullah University of Science and Technology, Thuwal, 23955, Saudi Arabia, ANTONIO ATTILI, RWTH Aachen University, Aachen, 52056, Germany, FABRIZIO BISETTI, University of Texas at Austin, Austin, TX, 78712, USA — A set of direct numerical simulations of turbulent premixed flames in a spatially developing turbulent slot burner at four Reynolds number is presented. This configuration is of interest since it displays turbulent production by mean shear as in real combustion devices. The gas phase hydrodynamics are modeled with the reactive, unsteady Navier-Stokes equations in the low Mach number limit, with finite-rate chemistry consisting of 16 species and 73 reactions. For the highest jet Reynolds number of 22×10^3, 22 Billion grid points are employed. The jet consists of a lean methane/air mixture at 4 atm and preheated to 800 K. The analysis of stretch statistics shows that the mean total stretch is close to zero. Mean stretch decreases moving downstream from positive to negative values, suggesting a formation of surface area in the near field and destruction at the tip of the flame; the mean contribution of the tangential strain term is positive, while the mean contribution of the propagative term is always negative. Positive values of stretch are due to the tangential strain rate term, while large negative values are associated with the propagative term. Increasing Reynolds number is found to decrease the correlation between stretch and the single contributions.

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