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Ignition and flame stabilization in turbulent premixed flames at diesel engine conditions SAMYAR FARJAM, Univ of Ottawa, BRUNO SAVARD, Polytechnique Montréal — We assess the role of turbulence on two-stage ignition dynamics and subsequent flame stabilization at diesel engine conditions matching those of the most reactive mixture in the Engine Combustion Network's *n*-dodecane Spray A flame (temperature of 813 K, pressure of 60 atm, equivalence ratio of 1.3, and with 15% vol. O_2 in the ambient gas) by performing direct numerical simulations in a simplified inflow-outflow premixed configuration. With an inflow velocity an order of magnitude larger than the laminar flame reference speed, in the absence of turbulence, ignition delays match those of the homogeneous reactor and both the cool and hot flames are spontaneous ignition fronts. Turbulence alters this picture as follows. First, the second-stage ignition delay increases, in contrast with the virtually unaffected first-stage ignition delay. Second, a sufficiently high turbulence intensity makes the cool spontaneous ignition front transition to a cool deflagration, while the hot flame is pushed further downstream, still stabilized by spontaneous ignition. Further increasing the turbulence intensity leads to both cool and hot flames transitioning to deflagrations. The mechanisms controlling this complex transition are explained and modelling challenges are discussed.

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