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Linear stability and long-time evolution of planar lean premixed H2/air flames[1] C. ALTANTZIS, C.E. FROUZAKIS, S. KERKEMEIER, Aerothermochemistry and Combustion Systems Laboratory, ETH Zurich, Switzerland, A.G. TOMBOULIDES, Dept. of Engineering and Management of Energy Resources, U. W. Macedonia, Kozani, Greece, K. BOULOUCHOS, Aerothermochemistry and Combustion Systems Laboratory, ETH Zurich, Switzerland — In the absence of buoyancy and acoustic interactions, two mechanisms can render premixed propagating flames unstable: hydrodynamic instabilities, stemming from the density jump across the flame, and thermal-diffusive instabilities in subunity Lewis number mixtures. In the present study, the linear stability of lean H_2/air flames as well as their long-term evolution is studied using both single-step and detailed chemistry in 2D rectangular domains of height h=3 to 80 laminar flame thicknesses with periodic boundary conditions imposed along the horizontal boundaries. At the inflow boundary, the lean (equivalence ratio $\phi = 0.6$) mixture enters with a velocity equal to the laminar flame speed, temperature T=298 K and pressure p=5 atm. At these conditions, the Lewis number of the fresh mixture is sufficiently lower than unity (Le=0.4) and the expansion ratio ($\sigma = 6.2$) is large enough so that both mechanisms play a destabilizing role.

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