Detailed numerical simulation of laminar partially premixed flame in a coflow combustor

J.F. Yu, R.X. Yu, X.S. Bai
Division of Fluid Mechanics, Lund University

Laminar partially premixed flame is investigated in a triple-jet coflow H₂/air combustion chamber configuration using a detailed numerical simulation method. The combustor is composed of two cylinders; one cylinder controls the degree of partial premixing and the second cylinder supplies air to oxidize the partially premixed fuel/air mixture. Several control parameters are identified, including the mixing cylinder length-to-diameter ratio L/D, the fuel/air mixture equivalence ratio in the mixing tube phi-1, the over-all equivalence ratio phi-2, and the nozzle Reynolds numbers. The flame structures are governed by these parameters. The structures and propagation of partially premixed flames in this combustor is studied employing detailed chemical kinetic mechanisms and detailed transport properties.