In this work, optical diagnostic techniques were applied in a standardized series of nitrogen-diluted ethylene diffusion flames stabilized on the Yale Coflow Burner. These flames were designed to provide a multi-dimensional and yet computationally tractable environment in which to study the formation, growth, and oxidation of soot particles. Chemically reacting flows, such as the sooting flames studied here, are the product of several highly coupled phenomena that includes chemical reaction, fluid dynamics, heat transfer, and mass transport. As such, it can be difficult to directly compare computational results to an experimentally measured parameter given the myriad of details that affect the computed parameter. In this talk, I will discuss how the two-dimensional temperature fields of the Yale coflow flames were measured experimentally and used to constrain a numerical simulation by fixing the temperature at each grid point. Thus, the computed temperature field was not driven by heat release from the chemical model or affected by distributed heat losses, and differences may be observed in species concentration or soot volume fraction between the constrained and unconstrained solutions.

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