

Abstract Submitted
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Experimental study of JPDF and conditional diffusion in three-stream mixing¹ MATTHEW DINGER, JIAN CAI, CHENNING TONG, Clemson University, CAMPBELL CARTER, WPAFB, MICHAEL RYAN — Three-stream scalar mixing is studied using flows issued from a center jet and an annulus into co-flow air. Rayleigh scattering and planar laser-induced fluorescence are used to obtain the mass fractions of the fluid from the jet (ϕ_1) and the annulus (ϕ_2). The JPDF of these mass fractions shows remarkable similarities to that of mixture fraction and temperature in nonpremixed reactive systems. The conditional scalar diffusion shows that diffusion generally transports the JPDF rapidly towards the conditional mean $\langle\phi_2|\phi_1\rangle$ and then relatively towards the peak of the JPDF. This suggests that the mixing of ϕ_2 is faster than ϕ_1 . The results can be compared to measurements in flames to understand the mixing of mixture fraction and temperature and turbulence-chemistry interaction in flames.

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Chenning Tong
Clemson University

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