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Consideration of Turbulence Effects in One-Dimensional Laminar Flamelet Equations[1] WAI LEE CHAN, Univ of Michigan - Ann Arbor, MATTHIAS IHME, Stanford University — The laminar flamelet formulation has been used as a fundamental building block for the construction of turbulent combustion closures. By assuming that turbulence only leads to a deformation and straining of the local flame structure, the turbulence/chemistry interaction is then considered through a presumed shape probability density function (PDF) approach. However, the consistency of this approach remains unclear in the context of large-eddy simulations (LES), and the objective of this study is to examine the representation of turbulent scalar fluxes and turbulence/chemistry coupling on the flame structure. To this end, a detailed numerical simulation of a turbulent counterflow diffusion flame is performed, and the simulation results are used to analyze the limitations of the classic laminar flamelet formulation and explore a possible alternative approach.

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Wai Lee Chan
Univ of Michigan - Ann Arbor

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