

Abstract Submitted
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Closure modeling for the conditional momentum equation in turbulent premixed combustion¹ JINYOUNG LEE, MICHAEL E. MUELLER, Princeton University — A manifold-based approach that relies on conditionally averaging the momentum equation against a progress variable has been recently proposed for modeling of combustion heat release effects on turbulence in turbulent premixed combustion. In this work, closure models for all relevant (conditional) unclosed terms in the conditional momentum equation are developed. Each of the models considers the relative contributions of combustion heat release and turbulent shear as distinct components to model flames at any finite Karlovitz number. The closure models are validated *a priori* against two DNS databases of turbulent premixed hydrogen/air planar jet flames at low and high Karlovitz numbers, where the influence of combustion heat release on turbulence is significant at low Karlovitz number and insignificant at high Karlovitz number. As a preliminary step, *a posteriori* validation of the models against the DNS databases is performed.

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