

Abstract Submitted
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A Moments-Based Method for Turbulent Combustion Based on Principal Components: A priori and a posteriori validation¹ HESSAM MIRGOLBABAEI, TAREK ECHEKKI, North Carolina State University, MECHANICAL AND AEROSPACE ENGINEERING TEAM — Moment-based methods have been widely used in turbulent combustion modeling. These methods are based on the reconstruction of thermo-chemical scalars' statistics from a set of transported moments. This study is concerned with the development of a systematic strategy to construct representative moments using principal component analysis (PCA) and non-linear variants of this method, mainly Kernel PCA and PCA based on a bottleneck artificial neural network. In order to transport the principal components, transport terms must be evaluated and tabulated for a reference problem that spans the desired composition space of the problem of interest. A formulation for these transport terms is developed and validated. *A priori* and *a posteriori* results are presented to validate the proposed moment-based approach and illustrate the computational saving resulting from its implementation.

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