A Trust-Region Constrained Fidelity Adaptive Combustion Model YEE CHEE SEE, HAO WU, QING WANG, MATTHIAS IHME, Stanford University — A general framework is developed to dynamically adapt the local fidelity of the combustion model for reacting flows. This framework combines a hierarchy of combustion models with different fidelity, and the adaptation is achieved by dynamically assigning a combustion model under consideration of their accuracy and computational cost. The usage of each model is confined to the trust region whose size is specified by the user. The applicability of a certain combustion model is determined by the compatibility between its manifold and the local flow field. By doing so, it becomes possible to conduct a reacting flow simulation, in which fidelity and cost are subject to user-specific requirements, and prior knowledge about the combustion regime is not necessary. This fidelity-adaptive model is applied to a triple flame to demonstrate its capability and the model performance is assessed through direct comparisons against a detailed numerical simulation.

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