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Machine learning assisted modeling of mixing timescale for LES/PDF of high-Ka turbulent premixed combustion JINLONG LIU, HAIFENG WANG[1], School of Aeronautics and Astronautics, Purdue University, West Lafayette, IN 47907, USA — A power-law scaling mixing model has been developed recently for modeling mixing in the large-eddy simulation (LES)/probability density function (PDF) modeling of high-Ka turbulent premixed combustion. In the power-law scaling model, two model parameters need to be specified and empirical models have been developed to specify the model parameters. It is found that the empirical models are limited to accurately represent the model parameters found in the DNS data for a turbulent premixed round jet flame from Sandia. In this work, we explore the feasibility of using machine learning for specifying the model parameters in the mixing timescale model. The Sandia DNS data are used as the training data and machine learning models are constructed by using the random forest algorithm. Different input parameters are examined for machine learning. The excellent performance of the machine learning model for specifying the model parameters in the power-law mixing timescale is demonstrated in the DNS flame through a priori analysis.

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