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A Lagrangian mixing frequency model for transported PDF modeling. HASRET TURKERI, XINYU ZHAO, university of connecticut — In this study, a Lagrangian mixing frequency model is proposed for molecular mixing models within the framework of transported probability density function (PDF) methods. The model is based on the dissipations of mixture fraction and progress variables obtained from Lagrangian particles in PDF methods. The new model is proposed as a remedy to the difficulty in choosing the optimal model constant parameters when using conventional mixing frequency models. The model is implemented in combination with the Interaction by exchange with the mean (IEM) mixing model. The performance of the new model is examined by performing simulations of Sandia Flame D and the turbulent premixed flame from the Cambridge stratified flame series. The simulations are performed using the pdfFOAM solver which is a LES/PDF solver developed entirely in OpenFOAM. A 16-species reduced mechanism is used to represent methane/air combustion, and in situ adaptive tabulation is employed to accelerate the finite-rate chemistry calculations. The results are compared with experimental measurements as well as with the results obtained using conventional mixing frequency models. Dynamic mixing frequencies are predicted using the new model without solving additional transport equations, and good agreement with experimental data is observed.

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