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Representing Model Inadequacy in Combustion Mechanisms of Laminar Flames REBECCA MORRISON, ROBERT MOSER, TODD OLIVER, Univ of Texas, Austin — An accurate description of the chemical processes involved in the oxidation of hydrocarbons may include hundreds of reactions and thirty or more chemical species. Kinetics models of these chemical mechanisms are often embedded in a fluid dynamics solver to represent combustion. Because the computational cost of such detailed mechanisms is so high, it is common practice to use drastically reduced mechanisms. But, this introduces modeling errors which may render the model inadequate. In this talk, we present a formulation of the model inadequacy in reduced models of combustion mechanisms. Our goal is to account for the discrepancy between the detailed model and its reduced version by incorporating an additive, linear, probabilistic inadequacy model. In effect, it is a random matrix, whose entries are characterized by probability distributions and which displays interesting properties due to conservation constraints. In particular, we investigate how the inclusion of the random matrix affects the prediction of flame speed in a one-dimensional hydrogen laminar flame.

Rebecca Morrison
Univ of Texas, Austin

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