

## A Proposal for a Combustion Model Considering the Lewis Number and Its Evaluation

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**Abstract :** The aim of this study is to develop a combustion model that can be applied uniformly to laminar and turbulent premixed flames while considering the effect of the Lewis number ( $Le$ ). The model considers the effect of  $Le$  on the transport equations of the reaction progress, which varies with the chemical species and temperature. The distribution of the reaction progress variable is approximated by a hyperbolic tangent function, while the other distribution of the reaction progress variable is estimated using the approximated distribution and transport equation of the reaction progress variable considering the  $Le$ . The validity of the model was evaluated under the conditions of propane with  $Le > 1$  and methane with  $Le = 1$  (equivalence ratios of 0.5 and 1). The estimated results were found to be in good agreement with those of previous studies under all conditions. A method of introducing a turbulence model into this model is also described. It was confirmed that conventional turbulence models can be expressed as an approximate theory of this model in a unified manner.

**Keywords :** combustion model, laminar flame, Lewis number, turbulent flame

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