

Simulation of Turbulent Diffusion Flames with Large Eddy Simulation and Conditional Moment Closure

Large eddy simulation (LES) of turbulent reactive flows using conditional moment closure (CMC) model is presented in this thesis. The ability of LES-CMC method to predict complex turbulent flames is shown in this thesis. First a literature survey is presented of the previous research on LES and CMC. Then the mathematical description of the LES and the CMC model is demonstrated. In the following the numerical method implemented for solving the governing equations is presented. Important objectives of this study are as follows.

1. Study the feasibility of LES-CMC approach
2. Investigation of the applicability of CMC models, which were originally developed for the Reynolds averaged Navier-Stokes (RANS) method, for usage with LES
3. Applying different sub-grid scale models to study their effect on the prediction of the turbulent flow field and the turbulence-chemistry interaction
4. Investigating the effect of CMC grid resolution on the accuracy of the predictions
5. Study the importance of chemical mechanisms on the predictions

Different diffusion flames have been studied in this work. The results obtained from the simulations show that the LES-CMC method is fully capable of simulating and predicting such complex turbulent flames.

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