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Technical Communication
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1 SUMMARY OF YU CANG'S RESEARCH PROJECT

Currently, my research focus on numerical simulation of the one-dimensional counter-flow diffusion flame.
Numerical schemes play an important role in solving this problem as proper schemes have better convergence performance.
Generally speaking, a hybrid scheme consists of the damped Newton method and the semi-implicit time stepping scheme is used.
At the beginning, I try to solve the steady-state equation set with the damped Newton method, once the newton iteration fails, it turns to solve the time-dependent equation set. In this way, a new starting estimation can be provided for the next trial of the newton method.

2 PARAPHRASE OF GUIWEN TAN'S WORK

A wide range of spatial and temporal scales exist in a turbulence field and they interact with each other.
The spatial structure at different scales is the focus of his reseach. In order to show the spatial structures at different levels, the multi-level segment analysis(MSA) method is adopted.
At present, he uses the sinusoidal function, fractional Brownain motion, and DNS result of real turbulence field to verify the MSA method. The statistical characteristics of each testing case indicates if the MSA method is justified.

3 IMPROVED VERSION OF YU CANG'S WORK

The configuration of one-dimensional counter-fow diffusion flame involves a burning chamber and two opposing placed inlents, where fuel and oxdizer are pumped into the chamber. A flame front burning in between is sustained, and that is counter-flow diffusion flame.
My research mainly focus on the numerical simulation of the one-dimensional counter-flow diffusion flame. Numerical method should be choosen carefully as some of schemes may converge faster and better.
Usually, I use the damped Newton method and the semi-implicit time stepping scheme in numerical simulation. At first, I use the damped Newton method to deal with steady-state equation set. Once the damped Newton method fails or diverges, I switch to the time-dependent equation set with the semi-implicit time stepping scheme. In this way, results from the time-dependent equation set can provide a new starting estimation for the newton method of next step.