

## **Investigation on flamelet models for three-feed non-premixed flame**

Yu Panlong

Three-stream non-premixed flame has been applied in many cases, and one of them we are focusing on is the “oxy-fuel” type gas turbine burner, in which oxygen, fuel, and diluent are mixed for the negative emission target. Yet, simulations of such flame using mixture fraction-based models are difficult, since multiple mixture fractions which are mixing ratios of each stream are required to describe the system. Flamelet model is appealing since it allows us to get access to the detailed chemical mechanism on the condition of modest computational cost by mapping a database which is established prior to the simulation. We proposed three kind of two-mixture fraction-based flamelet models which named by quasi-two-dimensional flamelet model, however, according to the results three models distinct with each other. In order to have a deeper insight into these models, and also to reveal the difference of these models with the complete two-dimensional flamelet model, it is necessary to put all these models in the same space (two-mixture fraction space), which is a real challenge. And also, in the large-eddy simulations coupling quasi-two-dimensional flamelet models, and a proper probability density function is indispensable. In this presentation, we will show the simulation results and also give detailed information about how we solve these problems: transferring the difference databases to those in the same space and implementing the probability density function in this space.