Implementation of unsteady flamelet progress model in OpenFOAM

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Abstract

This manual shows the implementation of a common turbulent combustion model, naming unsteady flamelet progress model with OpenFOAM.

1. Governing equations









1. Model for each term
2. , ,  , , : interpolated from the tabulated flamelet table.
3. For momentum equation:



,





1. For scalar terms:



1. For variance terms,



that is



with  replaced by quantity *Z* during calculation in the model of . We should notice the limitation that .

1. Dynamic procedure:

, , ,  are obtained via dynamic procedure:

, , 

, , 

, , 

, , 

In dynamic procedure, there’re two filters, the size of them is  and . Correspondingly, filtered quantity on these two scales are represented as  and .

**Table 1 Filtered quantity at two filters**

|  |  |  |
| --- | --- | --- |
|  | 1 () | 2 (=2) |
| Direct filtered |  |  |
| Favre filtered |  |  |

1. Tabulation
2. Solution procedure