Combustion Model for Industrial Numerical Simulations.

V.L. Zimont
CRS4 Research Center,
Z. I. Macchiareddu, P. O. Box 94,
I-09010 Uta(CA), ITALY

G.M. Goldin
Fluent, Inc.
10 Cavendish Court
Lebanon, NH/, 03766, USA

An original model for numerical simulation of turbulent premixed and partially premixed combustion at large Re and Da numbers is described. A quantitative description of the coupling between turbulence and chemistry by the flamelet mechanism is proposed, based on the generalized Kolmogorov concept of small-scale equilibrium structures in developed turbulence.

A model equations for premixed combustion is described in the terms of a reaction progress variable. This model has been implemented in the commercial code FLUENT5, and is validated against the experients by V. Karpov (spherical flames in a well-stirred reactor) and P. Moreau (high velocity combustion in a channel).

Partially premixed combustion is modeled by transport equations for the PDF of passive concentration and the conditional progress variable. Results of numerical simulations with turbulence-chemistry coupling by equilibrium and laminar-flamelet chemistry are compared with experimental data by Barlow and Frank.