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Influence of the Subgrid Models on Combustion Modelling

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Turbulent flows with combustion are among the most difficult problems occurring in nature and in industrial applications. A common appearance and importance of such flows require their correct prediction allowing for their optimization and control. The unsteady character of the turbulence implies the use of LES method which in turn allows to obtain time dependent solutions. This work concerns the analysis of the influence of subgrid models (subgrid viscosity) used within a framework of the LES method of turbulence/combustion modelling. To be able to perform such research it is necessary to exclude the effect of the numerical dissipation and its possible influence on the subgrid viscosity. The high order compact differences/pseudospectral numerical discretization method applied in computations allows for such an analysis and also guarantees very accurate results. The governing equations applied in this work are based on the low Mach number approximation while the combustion modelling is performed using a flamelet approach. The computations are performed for diffusive Sandia D flame and the results are compared with experimental data.

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