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Aspects Concerning Flame Propagation of Various Fuels in Combustion Chamber of Four Valve Engines

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Abstract : In this paper, results concerning flame propagation of various fuels in a particular combustion chamber with four tilted valves were elucidated. Flame propagation was represented by the evolution of spatial distribution of temperature in various cut-planes within combustion chamber while the flame front location was determined by dint of zones with maximum temperature gradient. The results presented are only a small part of broader on-going scrutinizing activity in the field of multidimensional modeling of reactive flows in combustion chambers with complicated geometries encompassing various models of turbulence, different fuels and combustion models. In the case of turbulence two different models were applied i.e. standard k-ε model of turbulence and k-ξ-f model of turbulence. In this paper flame propagation results were analyzed and presented for two different hydrocarbon fuels, such as CH4 and C8H18. In the case of combustion all differences ensuing from different turbulence models, obvious for non-reactive flows are annihilated entirely. Namely the interplay between fluid flow pattern and flame propagation is invariant as regards turbulence models and fuels applied. Namely the interplay between fluid flow pattern and flame propagation is entirely invariant as regards fuel variation indicating that the flame propagation through unburned mixture of CH4 and C8H18 fuels is not chemically controlled.

Keywords : automotive flows, flame propagation, combustion modelling, CNG
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