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Water Mist Behavior as Flame Supressant

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The present work focuses on the numerical simulation of the interaction of a water spray barrier and a premixed methane-air flame inside a closed tube. The water mist is modelled as an uniform cloud of monodispersed droplets. The principal mechanisms of interaction of the water spray against the flame are: the break-up, drag, heating and evaporation of the droplets. The work presents an overview of these models. It is analysed the behaviour of the barrier and identified the different vaporization regimes: diffusive and boiling. The results let identify the main mechanisms of break-up from the range of variation of the Eotvos and Weber Numbers. It is compared the propagation of an adiabatic flame with the one of a flame interacting with a water mist. The efficiency of water barriers of different diameters and liquid volume fractions is analysed as a function of the propagation velocity of the corresponding perturbed flames.

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