

Modelling of Heating and Evaporation of Biodiesel Fuel Droplets

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Abstract : This paper presents the application of the Discrete Component Model for heating and evaporation to multi-component biodiesel fuel droplets in direct injection internal combustion engines. This model takes into account the effects of temperature gradient, recirculation and species diffusion inside droplets. A distinctive feature of the model used in the analysis is that it is based on the analytical solutions to the temperature and species diffusion equations inside the droplets. Nineteen types of biodiesel fuels are considered. It is shown that a simplistic model, based on the approximation of biodiesel fuel by a single component or ignoring the diffusion of components of biodiesel fuel, leads to noticeable errors in predicted droplet evaporation time and time evolution of droplet surface temperature and radius.

Keywords : heat/mass transfer, biodiesel, multi-component fuel, droplet

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