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Effect of char on the combustion process of multicomponent bio-fuel

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Abstract

Combustion of pyrolysis oil has attracted many attention in recent years as a renewable and environmental friendly fuel. However, pyrolysis oil as an multi-component fuel has some differences compared to conventional fossil fuels. One of the main differences is the formation of solid char in the droplet during evaporation. The goal of this work is to study the effect of the solid char on the combustion characteristics of multi-component fuel. An Euler-Lagrange model of three phase gas/liquid/solid combustion is developed to study the detailed information about every phenomena in the process such as: heat, mass and momentum transfer between droplet and gas phase, droplet evaporation, homogeneous and heterogeneous reactions. The results indicate that the presence of the solid char and consequently its combustion elongates significantly the combustion region in a typical spray injection chamber/burner. Moreover, the gas phase reaches higher temperatures as a

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