

عنوان مقاله:

Effects of slip and Marangoni convection on single fuel droplet heat-up in the presence of thermal radiation

محل انتشار:

ششمین کنگره بین المللی مهندسی شیمی (سال: 1388)

تعداد صفحات اصل مقاله: 7

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خلاصه مقاله:

Slip and Marangoni convection effects on an isolated fuel droplet heat up process are numerically studied in the presence of thermal radiation. For small droplets, when the droplet size becomes comparable to the mean free paths of the surrounding gas molecules, the continuum hypothesis breaks down and it is important to account for the gas rarefaction effects including velocity slip and temperature jump at the gas-liquid interface. Gas phase velocity slip at the liquid interface reduces the momentum transfer to the liquid phase, while temperature jump at the interface acts as a thermal contact resistance, and therefore, both effects reduce the heat transfer to the fuel drop. In addition, the variation of surface tension along the surface of the fuel droplet, which causes the well-known Marangoni convection, is taken into account in the presence of thermal radiation which can play an important role in the heat up process of fuel drops. It is shown that the presence of thermal radiation in some fuels leads to a more uniform drop surface temperature and therefore, opposing the Marangoni convection effects.

کلمات کلیدی:

Slip, Marangoni convection, radiation, droplet heating, temperature jump

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