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Impact of nongray multiphase radiation in pulverized coal combustion[1] SOMESH ROY, Marquette University, BIFEN WU, University of Connecticut, MICHAEL MODEST, University of California, Merced, XINYU ZHAO, University of Connecticut — Detailed modeling of radiation is important for accurate modeling of pulverized coal combustion. Because of high temperature and optical properties, radiative heat transfer from coal particles is often more dominant than convective heat transfer. In this work a multiphase photon Monte Carlo radiation solver is used to investigate and to quantify the effect of nongray radiation in a laboratory-scale pulverized coal flame. The nongray radiative properties of carrier phase (gas) is modeled using HITEMP database. Three major species – CO, CO_2, and H_2O – are treated as participating gases. Two optical models are used to evaluate radiative properties of coal particles: a formulation based on the large particle limit and a size-dependent correlation. Effect of scattering due to coal particle is also investigated using both isotropic scattering and anisotropic scattering using a Henyey-Greenstein function. Lastly, since the optical properties of ash is very different from that of coal, the effect of ash content on the radiative properties of coal particle is examined.

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