PERFORMANCE OF METHOD OF LINES SOLUTION OF DISCRETE ORDINATES METHOD IN THE FREEBOARD OF A BUBBLING FLUIDIZED BED COMBUSTOR

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ABSTRACT. Predictive accuracy of the method of lines (MOL) solution of discrete ordinates method (DOM) is assessed by applying it to the prediction of incident radiative fluxes on the freeboard walls of a bubbling fluidized bed combustor, and comparing its predictions with those of the zone method and measurements. Freeboard is treated as a 3-D rectangular enclosure containing gray, absorbing, emitting and isotropically scattering medium. Radiative properties of the medium are calculated by using Leckner's correlations for gas and Mie theory for particles. Data for application and validation are generated from METU 0.3 MW_t atmospheric bubbling fluidized bed combustor test rig burning lignite in its own ash. Comparisons reveal that MOL solution of DOM provides accurate and computationally efficient solutions for wall fluxes in the freeboard of fluidized bed combustors containing particle laden combustion gases. Parametric studies are also carried out to analyze the sensitivity of predicted heat flux profiles to the presence of particles, particle load and anisotropic scattering.