EXTENSION OF A FAST NARROW BAND MODEL FOR CALCULATION OF THERMAL RADIATION IN COMBUSTION ENVIRONMENTS WITH HIGH CO CONCENTRATION

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ABSTRACT. Thermal radiation is an important heat transfer mechanism in most combustion applications. To accurately calculate the radiative heat transfer in a non-isothermal and inhomogeneous combustion environment, the radiation properties of the participating medium must be accurately evaluated. The statistical narrow band model which accounts the radiation wavelength dependence provides the most reliable engineering method for radiation properties evaluation. However, the traditional narrow band model is computationally very expensive. A fast narrow band model was previously developed to substantially speed up the computation while keeping the accuracy with main inclusion of H_2O, CO_2 and soot. CO can make a substantial contribution to radiation in combustion applications with high CO concentration such as the solid fuel gasifier. In this work, extension is made to the fast narrow band model by incorporating CO. Preliminary investigations have also been made to study the role of CO radiation in a combustion environment with high CO concentrations.