

APPLICATION OF BEM AND ANALYSIS OF THE ROLE OF RADIATION EFFECTS IN LABSCALE TURBULENT DIFFUSION FLAMES

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ABSTRACT. Labscale turbulent diffusion flames often emit a relatively small amount of heat by radiation and this radiative heat loss has been neglected in many studies on turbulence-chemistry interaction models. However, to obtain accurate predictions of quantities which are highly sensitive to temperature such as NO_x formation; it is necessary to take into account radiation effects. In the literature a simplified approach based on an “optically thin limit” approximation, considering in addition emission only, has been used [1,2] and such approximation has been recommended at the International Workshops on Measurement and Computation of Turbulent Non-Premixed Flames [2]. In this paper we criticize the use of this simple model because it violates the hypothesis of Local Thermodynamic Equilibrium (LTE) and also compare its predictions for the case of “Sandia Flame D” with the solution of the complete radiative energy balance equation obtained using by the most accurate solution method, the boundary element method (BEM).