

**CALCULATIONS OF THERMAL RADIATION TRANSFER OF C₂H₂ AND C₂H₄
TOGETHER WITH H₂O, CO₂, AND CO IN A ONE-DIMENSIONAL ENCLOSURE
USING LBL AND SNB MODELS**

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ABSTRACT. The Statistical Narrow-Band model parameters for C₂H₂ and C₂H₄ are generated. The distributions of the concentrations of radiating gases and the temperature along the centerline of a laminar ethylene/air diffusion flame were chosen to be tested. Thermal radiation transfer in the one-dimensional planar enclosure was calculated using the line-by-line model and the Statistical Narrow-Band model, and the results of these two models show good agreements. Below the height of 1.8 cm, the average fraction contributed by C₂H₂ and C₂H₄ in the radiative heat source is 38.6%, while that by CO is only 5.5%. This result indicates that the involvement of C₂H₂ and C₂H₄ in radiation heat transfer should be taken into account in the numerical modelling of the ethylene/air diffusion flame, especially in the early stage of combustion.