

**EFFECTS OF FLAME STRUCTURE ON ENTRAINMENT CHARACTERISTICS OF
A PLUME WITH TURBULENT DIFFUSION FLAMES**

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ABSTRACT Large-eddy simulations of a fire plume with flames and a buoyant plume without flames were performed. The effects of the flame structure on the entrainment characteristics in the flame region of a plume were then examined through comparison between the two sets of numerical results. The effects of the flame structure on the plume characteristics were marked only in the continuous flame and the intermittent flame regions in the fire plume. The existence of flames increased the mean value of the entrainment coefficient, which corresponds to entrainment efficiency, and the probability density of a high entrainment coefficient. In particular, a feature of a fire plume that prevents the forming of wide high-temperature area immediately above the fire source was suggested to increase the frequency of highly entraining motion.