

Surachai Watanadirek 2010: A Numerical Simulation of Inclined Fire Plume.
Master of Engineering (Fire Protection Engineering), Major Field: Fire Protection
Engineering, Interdisciplinary Graduate Program. Thesis Advisor:
Assistant Professor Nathasak Boonmee, Ph.D. 89 pages.

This research performs a LES (Large Eddy Simulation) calculation of inclined plume by a Computational Fluid Dynamics fire model called FDS (Fire Dynamics Simulator). The calculations are carried out for fire sizes of 7.5, 15, 22.5, and 30 kW with horizontal wind blows at speeds of 0.59, 0.89, and 1.15 m/s respectively. The research focuses on 2 objects: 1) a grid refinement study of numerical simulation of inclined plume and 2) effects of horizontal wind speed and fire size to an inclined plume tilt angle.

The grid refinement study is performed for 3 numerical grid sizes of 0.05, 0.025, and 0.0125 m. The FDS simulation results are then compared with the inclined plume experiment carried out by Oka *et al.* (2008) The grid refinement study shows that for the finest grid size of 0.0125 m, the percent difference between the numerical and experimental results is not more than 71.8% For the effects of horizontal wind speed and fire size to an inclined plume tilt angle, the study shows that for a given fire size, the tilt angle increases as the horizontal wind speed increases. On the other hand, for a given wind speed, the tilt angle decreases as the fire size increases.

Student's signature

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