World Academy of Science, Engineering and Technology
International Journal of Electronics and Communication Engineering
Vol:8, No:11, 2014

LARGE EDDY SIMULATION OF COMPARTMENT FIRE WITH GAS COMBUSTIBLE

Authors : Mliki bouchmel , Abbassi Mohamed Ammar1, Kamel Geudri , Chrigui Mouldi1, Omri Ahmed1

Abstract : The objective of this work is to use the Fire Dynamics Simulator (FDS) to investigate the behavior of a kerosene small-scale fire. FDS is a Computational Fluid Dynamics (CFD) tool developed specifically for fire applications. Throughout its development, FDS is used for the resolution of practical problems in fire protection engineering. At the same time FDS is used to study fundamental fire dynamics and combustion. Predictions are based on Large Eddy Simulation (LES) with a Smagorinsky turbulence model. LES directly computes the large-scale eddies and the sub-grid scale dissipative processes are modeled. This technique is the default turbulence model which was used in this study. The validation of the numerical prediction is done using a direct comparison of combustion output variables to experimental measurements. Effect of the mesh size on the temperature evolutions is investigated and optimum grid size is suggested. Effect of width openings is investigated. Temperature distribution and species flow are presented for different operating conditions. The effect of the composition of the used fuel on atmospheric pollution is also a focus point within this work. Good predictions are obtained where the size of the computational cells within the fire compartment is less than 1/10th of the characteristic fire diameter.

Keywords : Large eddy simulation, Radiation, Turbulence, combustion, pollution
Conference Title : ICEP 2014 : International Conference on Electronic Publications
Conference Location : journal city, WASET
Conference Dates : November 23-23, 2014