Asociación Argentina
de Mecánica Computacional

Mecánica Computacional Vol XXXVI, págs. 2223-2223 (resumen)
José G. Etse, Bibiana M. Luccioni, Martín A. Pucheta, Mario A. Storti (Eds.)
San Miguel de Tucumán, 6-9 Noviembre 2018

NUMERICAL EVALUATION OF CARBON MONOXIDE DISPERSION IN A GENERIC URBAN CANYON

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Key words: Pollutant dispersion, urban canyon, carbon monoxide, CFD.

Abstract: The understanding of gases dispersion phenomena in atmosphere is very important to population life quality, as the accumulation of pollutants can lead to serious health problems. On this context, the urban canyons are favorable areas to the accumulation of pollutants, due to fluid dynamic effects, inherent in these configurations, such as recirculation. An increasingly widespread and improved tool for understanding the gas dispersion phenomenon is Computational Fluid Dynamics (CFD). The present work evaluates the dispersion of carbon monoxide (CO) in a generic urban canyon. The evaluated computational domain presents three buildings arrays. The Fluent/ANSYS^{TM} 18.2 software was used for simulation, and the Finite Volume Method was used to solve conservation equations of mass, momentum, energy, and species concentration along the computational domain. The turbulence equations were solved through the STT k-ω Model. The pressure and velocity coupling were solved through the SIMPLEC Algorithm. A polynomial velocity profile was used at domain inlet to better represent the real atmospheric conditions. A 10 seconds transient simulation was performed. Different emission velocities of 0.3, 0.6, and 0.9 m/s were considered. This study allowed the observation of pollutant accumulation regions along with the time, of the fluid dynamics effects and of the significant impact of the emission velocity on pollutant dispersion. It is possible to observe the concentration increase within the urban canyon, while CO inlet velocity decreases. The results of such researches may help the authorities to improve building legislations and assure a better life quality to urban population.