

Experimental and Numerical Study of Thermal Effects in Variable Density Turbulent Jets

Authors : DRIS Mohammed El-Amine, BOUNIF Abdelhamid

Abstract : This paper considers an experimental and numerical investigation of variable density in axisymmetric turbulent free jets. Special attention is paid to the study of the scalar dissipation rate. In this case, dynamic field equations are coupled to scalar field equations by the density which can vary by the thermal effect (jet heating). The numerical investigation is based on the first and second order turbulence models. For the discretization of the equations system characterizing the flow, the finite volume method described by Patankar (1980) was used. The experimental study was conducted in order to evaluate dynamical characteristics of a heated axisymmetric air flow using the Laser Doppler Anemometer (LDA) which is a very accurate optical measurement method. Experimental and numerical results are compared and discussed. This comparison do not show large difference and the results obtained are in general satisfactory.

Keywords : Scalar dissipation rate, thermal effects, turbulent axisymmetric jets, second order modelling, Velocimetry Laser Doppler.

Conference Title : ICCCE 2015 : International Conference on Civil and Construction Engineering

Conference Location : Jeddah, Saudi Arabia

Conference Dates : January 26-27, 2015