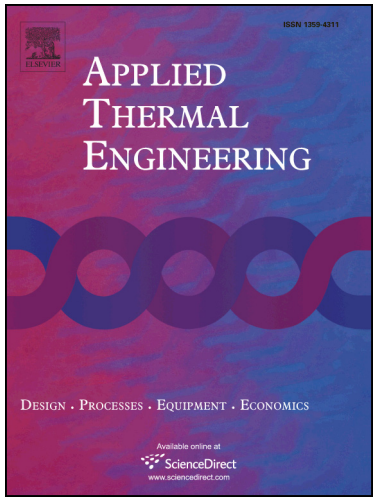


# Numerical and Experimental Investigation of Turbulent three separated jets

A. Hidouri, N. Yahya, T. Boushaki, A. Sadiki, J.C. Sautet

PII: S1359-4311(16)30673-1
DOI: http://dx.doi.org/10.1016/j.applthermaleng.2016.05.021
Reference: ATE 8233

To appear in: *Applied Thermal Engineering*

Received Date: 3 December 2015
Revised Date: 28 April 2016
Accepted Date: 3 May 2016

Please cite this article as: A. Hidouri, N. Yahya, T. Boushaki, A. Sadiki, J.C. Sautet, Numerical and Experimental Investigation of Turbulent three separated jets, *Applied Thermal Engineering* (2016), doi: http://dx.doi.org/10.1016/j.applthermaleng.2016.05.021

# NUMERICAL AND EXPERIMENTAL INVESTIGATION OF TURBULENT THREE SEPARATED JETS

**A. Hidouri[1], N. Yahya[1], T. Boushaki[2], A. Sadiki[3], J. C. Sautet[4]**

*(1) U.R. MEER-Campus Universitaire Sidi Ahmed Zarrouk - 2112 Gafsa, Tunisie*

*(2) Institut de Combustion, Aérothermique, Réactivité et Environnement ICARE - UPR 3021 CNRS, France*

*(3) Institute for Energy and Powerplant Technology, TU Darmstadt, Petersenstr. 30, 64287 Darmstadt, Germany*

*(4) CORIA UMR 6614 - Université de Rouen Site Universitaire du Madrillet BP 12, 76801 Saint Etienne du Rouvray Cedex, France.*

Contact : Ammar.hidouri@enim.rnu.tn

## Abstract

In this work three-dimensional turbulent and separated jets are numerically studied and compared with experimental data. The basic idea of the separated jet burner consists in separating fuel and oxidizer injection to dilute reactants with combustion products before the reactants mix. The computation is achieved using the finite-volume numerical method. The turbulence is modeled using a second order Reynolds Stress Model (RSM) by Launder-Reece-Rodi. A non uniform grid is applied and particularly tightened close to the exit jets in order to capture the near field mechanisms. The validation of the numerical tools is done by comparison with experimental data of the non ventilated jets. Ventilated jets are investigated only numerically. The obtained results show that mixing is improved using three jets compared to the single jet. A comparison between computed ventilated and non ventilated jets is presented. It yields a larger velocity mean value, but a decreasing of the corresponding root mean square of the turbulent velocity fluctuations (rms).

*Keywords : Separated jets, non ventilated jets, ventilated jets, Turbulent mixing, Reynolds Stress Model, Dynamic fluctuations, Scalar fluctuations.*