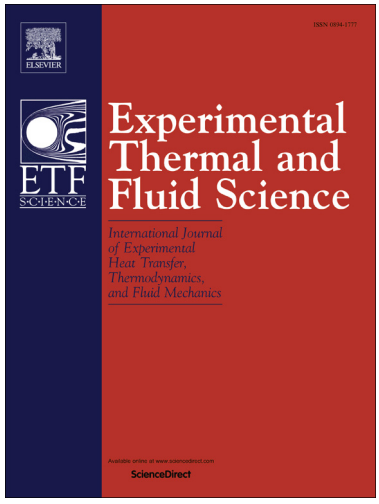

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Paolo Gobbato, Massimo Masi, Alessandro Cappelletti, Marco Antonello

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Research paper (BLANKED VERSION)

Effect of the Reynolds number and the basic design parameters on the isothermal flow field of low-swirl combustors

Paolo Gobbato[a,*], Massimo Masi[b], Alessandro Cappelletti[c], and Marco Antonello[b]

[a] Veil Energy Srl, Via Siemens, 19 – 39100, Bolzano, Italy

[b] University of Padova, Department of Management and Engineering, Stradella S. Nicola, 3 – 36100, Vicenza, Italy

[c] University of Florence, Department of Industrial Engineering, Via di S. Marta, 3 – 50139, Florence, Italy

Abstract

Fluid dynamic design of combustors is commonly aimed to set up swirling flows through sudden expansions to stabilise the flame. Fuel-air mixing promoted by the swirling motion also contributes to increase the reaction rate and the efficiency of the combustion process, and, consequently, to reduce pollutant emissions.

Most of the experimental studies available in the scientific literature investigate the aerodynamics of high-swirl combustors. In such combustors the expansion of the flow in the combustion chamber produces a central recirculation zone (CRZ) which provides a stable anchoring to the flame. By comparison, few studies analyse the structure of low-swirling flows, in which the tangential component of velocity is not strong enough to induce a CRZ. However, many combustion systems for heat and power generation are currently designed to operate with low-swirling or unswirled flames and show a stable combustion over a wide range of thermal loads.

This study deals with isothermal low-swirling flows generated by axial swirlers and aims at providing a comprehensive insight of the flow field by considering the effect of the Reynolds number and some relevant design parameters of the swirler-combustion chamber assembly. The paper

* Corresponding author.
E-mail address: paolo.gobbato@unipd.it
Phone: +39 049 827 6748