Heat flux characterisation in hot jet and flame / wall interaction by IHCP resolution coupled with infrared measurements

by R. Loubat* - P. Reulet** - B. Estebe* - P. Millan**

**AIRBUS France ESANT, 316 route de Bayonne, 31060 Toulouse CEDEX 3*
**ONERA / DMAE, 2 av. Edouard Belin BP 4O25, 31055 Toulouse CEDEX 4*

Abstract

The aim of this work is to identify the heat fluxes between turbulent flames and 3D solids in order to improve the conception of aeronautic structures designed to comply with aircraft certification requirement on fire events. The transient temperature rise prediction inside the impinged structure will be representative if the convective and radiative heat fluxes used as boundary conditions of the numerical model are accurately known. To do so, we need to separate these two different heat transfer contributions from the total heat flux information, obtained by solving an IHCP (Inverse Heat Conduction Problem). The inverse technique that was implemented for this study is based on adding back-face infrared measurements data as observation equation, thus closing this ill-posed problem. To improve our flame to wall heat transfer knowledge, a dedicated test bench composed of a propane/air burner and a 14 kW air heater was built and studied. In the scope of this study, we present the comparison between propane/air flame and hot round isothermal air jet impinging perpendicularly on a titanium plate.

Published in the QIRT Journal, volume 1, issue 2