

**THERMAL RADIATION EFFECTS IN RANS SIMULATIONS OF A 2D  
AXISYMMETRIC TURBULENT DIFFUSION FLAME**

**Felipe Roman Centeno\*, Francis H. R. França\*, and Cristiano Vitorino da Silva\*\***

\*Federal University of Rio Grande do Sul

Sarmiento Leite St., n. 425, Cep 90050-170, Porto Alegre, RS, Brazil

\*\*Universidade Regional Integrada do Alto Uruguai e das Missões

Sete de Setembro Ave., n. 1621, Cep 99700-000, Erechim, RS, Brazil

**ABSTRACT.** Radiation effects of non-gray gases were estimated by the WSGG model based on new correlations and including TRI, for a turbulent diffusion methane–air flame, to evaluate the influence of radiation on the overall thermal behavior. Comparing results from the simulations (calculations with/without radiation, and with/without TRI), it was verified that temperature, radiative heat source, and wall heat flux were importantly affected, while the influence on species concentrations was negligible. Numerical results considering radiation, when compared to the case neglecting it, were closer to experimental data presented in the literature. Inclusion of TRI enhanced that agreement, although the influence of radiation (without TRI) was still greater than of TRI. The main influence of TRI was on global results (peak temperature, radiant fraction). Therefore, to achieve correct simulated predictions for the thermal behavior of a combustion chamber, it is mandatory to use a proper radiation model, and if possible, including TRI

**KEYWORDS.** Radiation, WSGG model, Combustion, Turbulent diffusion flames, TRI, DOM