Transient thermal analysis of radiant burner behavior by using porous media

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Abstract– In this work a one dimensional model is used to solve the transient heat transfer of all radiation, convection and conduction governing equation for both porous media and gas flow before the premix flame. Combustion in the porous medium is modeled as a spatially dependent heat generation zone and simply as a pointy generation in the equations. The solid phase (porous medium) is assumed to be absorbing, emitting and scattering, while the gas phase is considered transparent to radiation, so it is not considered the radiation effect of gas medium. In order to analyze the thermal behavior of porous burners, the coupled energy equations including conduction, convection and radiation in and between the porous medium and gas phase shall be solved simultaneously, while the radiation equations in porous medium in based on two–flux radiation model are solved numerically and the effect of various factors on the performance of porous radiant burners are determined. Comparison between the present results with those obtained by other investigators shows a good agreement.

Keywords – Porous radiant burners, two–flux model, transient condition

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