

عنوان مقاله:

Numerical Study of Non-Gray Radiative Heat Transfer in a T-shaped Furnace

محل انتشار:

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خلاصه مقاله:

Radiative heat transfer has an important role in many industrial equipment; i.e. furnaces, boilers and high temperature heat exchangers. In this paper, combination of Weighted Sum of Gray Gas Method (WSSGM) and Discrete Ordinate Method (DOM) are used together in order to numerically study the radiative heat transfer behavior in a non-gray participating medium. Moreover, the concept of Blocked-off region for irregular geometries is used to simulate the T-shaped furnace. The effect of different radiative parameters, i.e. scattering coefficient and wall emissivity on thermal behavior and wall heat fluxes is investigated and compared for both gray and non-gray media. The results show that when scattering coefficient increases, more radiation is scattered in the medium and therefore less heat flux reaches the walls such that by increasing scattering coefficient from 1.0 to 5.0, the incident radiative heat flux decreases up to 15% in some parts of bottom wall. It is seen that by increasing wall emissivity from 0.5 to 1.0, wall heat flux increases more than 60%. Moreover, results show that, by increasing the temperature, the maximum error strongly increases which indicates that in many engineering problems, the gray medium assumption leads to great error in results.

کلمات کلیدی:

Blocked-Off, Discrete Ordinate Method, Non-Gray Media, Radiative Heat Transfer, Weighted Sum of Gray Gas Method

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