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# THERMAL RADIATION CHARACTERISTICS IN COMBUSTION

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ABSTRACT. For many practical engineering applications, radiative heat transfer is an essential and important phenomenon among other heat transfer modes. Especially, in high temperature equipment such as industrial power plants, gas turbine combustors, and reheating furnaces for steel production, necessity for the analysis of radiative heat transfer has led to an increased demand for developing a well-designed computational radiation model. In general, the most important issues related to the radiative heat transfer in practical combustion analysis have been to develop the numerical solution procedure of the radiative transfer equation governing the thermal radiation process and the spectral behavior of the participating medium.

Two phase mixture is also very common in practical engineering system such as particle-gas heat exchanger, pulverized coal furnace, solid rocket motor etc. Since various radiating gases, soot particles and poly-dispersed particulates are involved in diverse thermal processes, the thermal radiation is considered to play as significant a role as the other heat transfer mode does. Nevertheless, its complete modeling is far from being complete due to various complexities in dealing with radiative properties of non-gray gases, multi-dimensional complex geometry, and computational efficiency as well as accuracy. Consequently, much attention was paid to only the radiation solution procedure and the spectral characteristics of the gases and particles. The objective of this presentation is now to review and discuss the effects of radiative heat transfer on various combustion phenomena.

In this presentation, the effects of thermal radiation are so diverse that they are to be considered and discussed based on following conditions; steady or unsteady, confined or open configuration in various kinds of combustion phenomena. These effects are also influenced by radiative properties, e.g., especially optical thickness. A change in the radiative heat flux is manifested in different way through far reaching effect or heat blockage effect, when the optical thickness is varied.

An inverse analysis topic for diffusion-controlled turbulent combustion with thermal radiation is also to be addressed. Furthermore, the thermal radiation characteristics in practical engineering systems such as NOx reduction system and reheating furnace for heating a steel slab are examined and discussed as well.