



Spectral Modelling of Radiative Heat Transfer in Industrial Furnaces

By Jochen Ströhle

Shaker Verlag Feb 2004, 2004. Taschenbuch. Condition: Neu. Neuware - The radiative properties of the combustion gases are considered as grey in most radiative heat transfer calculations of industrial furnaces, which may lead to inaccurate predictions of the temperature distribution and the wall heat fluxes. Most non-grey models from literature are computationally far too expensive for three-dimensional combustion simulations. An efficient approach for the spectral modelling of radiation in combustion systems has been evaluated in the present work. Several approaches to the Exponential Wide Band Model (EWBM) have been investigated. These are, first, the original method using a four-region expression for the total band absorption, second, the numerical integration of the spectral transmittance within narrow wave number intervals, and third, the reordering of the lines to yield a smooth function of the absorption coefficient around the band centre, named the Wide Band Correlated-k Method (WBCK). The WBCK uses the absorption coefficient as the basic radiative property, which allows the coupling with differential solvers for the radiative transport equation. By now, it has only been applied to calculate emissivities of homogeneous and isothermal single gases. An algorithm to expand the method for non-homogeneous and non-isothermal mixtures of gases has been developed...



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