

THERMAL RADIATIVE PROPERTIES OF COMPLEX MEDIA: SOME RECENT ADVANCES AND CONTINUING CHALLENGES

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Abstract. In many practical engineering applications and natural phenomena thermal radiation interacts with complex media composed of dispersed phases that may be of different type : solid/solid, solid/gas, or liquid/gas. Most of them are semi-transparent media which emit, absorb, and scatter thermal radiation. Heat transfer by combined radiation with conduction or convection in such media is a problem of high practical importance, mostly in situations where radiation is the dominant mode. Improvement of thermal performance of such materials or of manufacturing processes which involve these media requires the availability of efficient methods i) for radiative transfer modelling, and ii) to predict and/or to experimentally determine the thermophysical properties in order to feed the models. This paper is focused on radiative properties assessment. After a brief overview of the materials and properties of interest, methods of property investigation, both predictive and experimental, are scanned. Then examples are presented showing recent advances and continuing challenges. Some examples are based on work performed at CETHIL (The Thermal Science Centre of Lyon) and/or in the frame of international partnerships.

Keywords . radiation, heat transfer, semitransparent media, radiative properties, identification.

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