Proceedings of the 9th International Symposium on Radiative Transfer, RAD-19
June 3-7, 2019, Athens, Greece

RAD-19 NH04

CRITICAL MICRO-TEXTURAL DETAILS INFLUENCING RADIATIVE TRANSPORT IN HETEROGENEOUS MATERIALS

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ABSTRACT. The numerical resolution of wave-matter interaction on complex micro-heterogeneities constituting modern industrial materials poses significant computational hurdles. These computations hold a crucial role in the design cycle meant to optimize their participating behavior at high temperatures. To arrive at a reasonable conclusion at the expense of optimal resources, some textural details inherent to these materials are often truncated. For the accurate resolution of multi-scale thermal radiative transport, very little is known today about the role of these truncated textural information to the overall effective radiative properties. With the ultimate prospect of large scale finite element modeling of electromagnetic scattering for participating media, this initial attempt in 2D tries to explore this aspect, learning from the ability of fractals to quantify textural details or roughness of complex objects. Based on a desirable error tolerance, critical quantitative limits for resolution were drawn, with which future large scale electromagnetic scattering computations can be performed confidently, with optimum resources, without compromising the accuracy.