Contribution ID: **369** Type: **Oral Presentation**

Random Walks and Simplified Marching Cube for image-based simulations of heat or mass transfer in evolving porous media and applications to Ceramic-Matrix Composites

Wednesday, 2 June 2021 15:45 (15 minutes)

Simulation problems linked to the fabrication and degradation of Ceramic-Matrix Composites involves a precise knowledge of effective heat and mass transfer properties of porous media at the fiber scale and the fabric scale. When dealing with complex reinforcement architecture, predictive tools have to be able to handle large 3D images, including the capability to modify them through infiltration or ablation phenomena. This presentation will describe a class of methods developed to fulfil these requirements. Monte-Carlo/Random Walks have the interesting property of simulating diffusive, ballistic or mixed-mode transfer phenomena in a straightforward way. Moreover, they require a very small amount of extra memory in addition to image storage, thus enabling simulations in very large images. Coupled to an efficient interface discretization scheme, the Simplified Marching Cube, they are very efficient.
Example of applications to simulations of Chemical Vapor Infiltration, featuring rarefied gas transfer, chemical deposition and porous medium densification, and to simulations of conducto-radiative heat transfer in fibrous media will be given, in order to illustrate the versatility and performance of this class of methods.

Time Block Preference

Time Block A (09:00-12:00 CET)

References

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