

Séminaire de mathématiques et leurs applications

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Titre: Combined conductive-radiative heat transfer analysis in complex geometry using the monte carlo method.

Résumé: Deterministic methods are commonly used to solve the heat balance equation in three-dimensional (3D) geometries. The presentation will show a preliminary study that validates the use of a probabilistic method for the computation of the temperature in complex 3D geometries where the combined conductive and radiative heat transfers are coupled. The resulting algorithm simulates a probe result (such as the temperature at a given point and at a given time) or any surface, volume or time integral of such physical quantity. The Monte Carlo algorithm and its results are validated by a comparison with the results obtained with a standard finite-volume method. For its execution, state-of-the-art computer graphics tools are used to deal with the geometric complexity. The test case is a combined radiative-conductive problem in a 3D stack of Kelvin cells between two plates with known boundary temperatures. The average temperature profiles associated with computation times will be used to compare the results of the deterministic and probabilistic methods.