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DETERMINISTIC AND STOCHASTIC APPROACHES FOR THE MODELING OF CONDUCTION-RADIATION COUPLING WITHIN NON-BEERIAN SEMI-TRANSPARENT MEDIA

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ABSTRACT. This article presents two very different models for the resolution of conduction-radiation coupling within a grey non-Beerian semi-transparent slab enclosed between two opaque surfaces imposing their intensities and temperatures. The first one is deterministic, based on the finite difference scheme and the discrete ordinate method. The second one is fully stochastic, using ray tracing for the modeling of the radiative transfer and a Brownian walkers method for the modeling of conduction. These two models allow the evaluation of the temperature and radiative volume power in Beerian and fictitious non-Beerian semi-transparent media. The results of these two models are compared and show excellent agreement. It is also shown that a non-Beerian radiative behavior can have a significant impact on the temperature and radiative power fields.

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