TRANSIENT RADIATIVE TRANSFER IN THREE-DIMENSIONAL HOMOGENEOUS AND NONHOMOGENEOUS PARTICIPATING MEDIA

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ABSTRACT. The transient radiative transfer is studied by an integral equation model. The salient feature of the integral formulation is the revelation of the time-dependent domain of integration (or domain of influence). This transient model can be reduced to simulate the steady state radiative transfer and, thus, it is a general formulation. To demonstrate the effectiveness of the model, the transient radiative transfer in a rectangular volume with absorbing and isotropic scattering medium is considered. Diffuse irradiation enters at one boundary surface. The other five boundaries are cold and black surfaces. The spatial and temporal distributions of the integrated intensity and radiative flux are presented for different radiative property distributions. Numerical quadratures used are the discrete rectangular volume method and YIX method. The results show good agreement between two methods. The discrete rectangular volume method is a variation of the general quadrature method.