SOLUTION CONVERGENCE ACCELERATION OF DISCRETIZED RADIATIVE TRANSFER EQUATION USING SYNTHETIC ITERATION METHOD

Vladimir P. Budak, Oleg V. Shagalov
National research university "MPEI" 14,
Krasnokazarmennaya, Moscow, 111250 Russia

ABSTRACT. The numerical solution of the radiative transfer equation (RTE) is possible only by its discretization that requires elimination of the solution anisotropic part including all the singularities. Discretized RTE for the turbid medium slab has the unique analytical solution in the matrix form. The number of ordinates for the solution regular part is determined by the size of the discretization of the radiance angular distribution by taking into account the necessary detail of this distribution. Significant acceleration of convergence can be achieved by using the method of synthetic iterations. At the first step the discrete ordinates method with the solution anisotropic part elimination on the basis of small-angle modification of the spherical harmonics method is used with a small number of ordinates that provides a good mean convergence in power. At the second step the angular distribution is refined in the uniform metric by using the iteration of the solution obtained at the first step.