Keywords: light polarization, cloudiness, Monte Carlo method, numerical simulation, CUDA parallel programming technology.

Radiation codes developed for numerical simulation of the polarized radiative transfer in the Earth’s atmosphere are discussed. The results of their testing in the aerosol atmosphere and the cloud layer as well as the results of calculation of the Stokes vector in a medium with spatially inhomogeneous clouds are presented. The acceleration rate of the codes achieved by parallelizing computational algorithms on a graphics processor is given.