Vector Monte-Carlo algorithms for polarized radiative transfer process

G.A. Mikhailov[123], S.M. Prigarin[12], S.A. Rozhenko[1]

There are two versions of weighted vector algorithms for the statistical modeling of polarized radiative transfer: a "standard" one, which is convenient for parametric analysis of results, and an "adaptive" one, which ensures finite variances of estimates [1, 2, 3]. The application of the adaptive algorithm is complicated by the necessity of modeling the previously unknown transition density. An optimal version of the elimination algorithm used in this case is presented in this talk. A new combined algorithm with a finite variance and an algorithm with a mixed transition density are constructed. The comparative efficiency of the latter is numerically studied as applied to radiative transfer with a molecular scattering matrix. Statistical kernel estimates were constructed for the angular distributions of the vector intensity.

References

[1] G. I. Marchuk, G. A. Mikhailov, M. A. Nazaraliev, et al., The Monte Carlo Methods in Atmospheric Optics, Springer-Verlag, Berlin, 1980.

[2] G. W. Kattawar and G. N. Plass, Appl. Opt. 7 (8), 15191527 (1968).

[3] M. Kerscher, W. Krichbaumer, M. Noormohammadian, and U. G. Oppel, Opt. Rev. 2 (4), 304307 (1995).

[1]Institute of Computational Mathematics and Mathematical Geophysics, SB RAS, prospect Akademika Lavrentjeva, 6, Novosibirsk, 630090, Russia.

[2]Novosibirsk State University, Pirogova Str., 2, Novosibirsk, 630090, Russia.

[3]E-mail: `gam@sscc.ru`