Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

AAS21-01 会場:201B 時間:5 月 27 日 15:15-15:30

体積積分法にもとづく煤粒子の高精度な光学計算手法の開発
Volume Integral Equation Method Optimized for Black Carbon-Containing Aerosol Particles

茂木 信宏 [1*]
NOBUHIRO, Moteki[1*]

[1] 東京大学大学院理学系研究科
[1]Department of Earth and Planetary Science, The University of Tokyo

We propose a robust scheme of volume integral equation method (VIEM) for light scattering and absorption by black carbon-containing aerosol particles: the fractal-like aggregates of absorbing black carbon (BC) spherules that may be mixed with non-absorbing (or weakly absorbing) compounds. Conventionally, a particle volume has been uniformly approximated as a collection of small volume elements (dipoles) on a cubic lattice (CL). In the proposed scheme, each BC spherule is considered as a spherical dipole with original size, while remaining particle volume occupied by non-absorbing compounds is approximated by a collection of dipoles on a CL. We call this as Spherule-Retained-Cubic-Lattice (SRCL) scheme. For several model BC-containing particles, positive absorption bias of ˜30% persistent in the CL scheme is success-fully eliminated in SRCL scheme. The interaction matrix (i.e., discretized volume integral operator) associated with the SRCL scheme has less simple structure compared with that for CL scheme. We propose some key strategies for mitigating memory and computational costs in solving the matrix equation in the SRCL scheme.

キーワード: 大気放射, 光散乱理論, エアロゾル, ブラックカーボン
Keywords: Atmospheric Radiation, Light Scattering Theory, Aerosol, Black Carbon