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Database of the light scattering matrices for ice crystals of cirrus clouds for developing the inversion algorithms

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The study of the microphysical properties of ice crystal particles of cirrus clouds by active and passive remote sensing is a complex problem of atmospheric optics. This is due to the fact that, unlike liquid-drop clouds and atmospheric aerosol, where particles can be described with good accuracy in terms of the spheroid model, ice crystals have a more complex shape. A wide variety of shapes and sizes of ice crystals leads to great difficulties in solving the direct light scattering problem that is necessary to develop the inversion algorithms.
We succeeded in solving the light scattering problem for ice particles typical for cirrus clouds with sizes from 10 to 1000 microns with convex and non-convex shapes within the framework of the physical optics method[1,2]. The solution is presented as a convenient database of light scattering matrices (Mueller matrices). Such a databank opens up the possibility of developing efficient inversion algorithms for retrieving the microphysical properties of cirrus cloud particles from the data of active and passive remote sensing.
In addition to the solution for ice crystal particles, the database contains the solution for some typical large atmospheric aerosol particles.
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Keywords: light scattering, cirrus clouds, aerosol, retrieval algorithm

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