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# Speeding up the polarized radiative transfer model

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Polarization becomes more and more important in current and future remote sensing of aerosol and cloud, as it could provide more information than that of intensity-only measurements. While forward simulation of polarization of light during its transfer in the earth-atmosphere system is still a burden for non-look-up-table retrieval, and a fast, stable and accurate forward model is of the first prerequisite in developing novel inverse algorithm. To speed up the polarized simulations, a new approximation of the Stokes Vector through scalar radiative transfer is introduced into our previous developed model SOSVRT, which is a polarized radiative transfer model based on successive order of scattering. This approximation method is tested and validated with clear sky, aerosol heavy-loading atmosphere, low cloud and high thin cloud, the results show that the efficiency of the new version of SOSVRT is greatly enhanced without losing accuracy, especially for optically thick scattering media such as atmosphere with heavy aerosol and/or cloud, the computation time reduce by tens of times.