Tables Related to Radiation Emerging from a Planetary Atmosphere with Rayleigh Scattering

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(8½ in. x 11 in., xii+ 548 pp., University of California Press, 1960)

This substantial volume consists of 12 pages of reading matter and 548 pages of tabulation and is designed to provide the following information. Given the flux of solar radiation at any wavelength incident normally on the outside of the Earth’s atmosphere, the total intensity $I$ in that wavelength of Rayleigh-scattered light (a) downward and (b) upward from an optical depth $\tau$ of clear unabsorbent atmosphere is given as a function of the zenith distances of the Sun and of the diffuse radiation, azimuth and surface reflectivity. The degree of polarization $P$, the angle between the plane of polarization and the vertical plane in the appropriate azimuth, and the Stokes parameters $Q$ and $U$ of the scattered radiation are also given for each combination of the independent variables. $I$, $P$, $Q$ and $U$ are tabulated to five places after the decimal point.

The volume is appropriately introduced by a preface from Professor S. Chandrasekhar who modestly states that the exact solution of the Rayleigh problem was immediately available given the tools of the Stokes parameters. In fact of course Chandrasekhar’s famous text Radiative Transfer (1950) materially helped to pave the way to the present volume and for its realization a great debt of gratitude is owed to Professor Z. Sekera and his colleagues who have made themselves experts in this field over the last decade or so. One must also thank the electronic computer for turning formulae into numbers.

The tables are clearly set out and printed and the introductory explanation is adequate but would have benefited from some expansion to make it more self-contained. For example, the optical depth $\tau$ is only given for an atmosphere above sea level at seven wavelengths and it is not explicitly stated that the solution provides for multiple scattering. There are many prospective users of these tables who will not themselves be expert in the theory of radiative transfer.

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