ON THE INVERSION OF BISTATIC LIDAR RESULTS

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ABSTRACT

Experimental results obtained by Holland and Gagne (1) indicate that the Mueller scattering matrix elements for randomly oriented irregularly shaped particles behave differently from those for spherical particles with the same diameter distribution. The objective of the work described here was to determine the extent to which the discrepancies could be accounted for in terms of absorption.

Values of the particle refractive index from (1.55,-0i) (assumed by Holland and Gagne) to (1.55,-0.1i) were considered and a computer tape of the matrix elements as a function of scattering angle for a range of particle sizes was generated for each refractive index considered using Mie theory. Numerical integration over the measured particle diameter distribution was then applied to each tape and the weighted sum of squares of the residuals computed for each matrix element, as well as for the composite of all the experimental results.

The results indicate that although the leading matrix element can be fitted satisfactorily, it is not possible to obtain a satisfactory fit over all of the matrix elements. The implications of these results in terms of the analysis

(1) Holland, A.C. and Gagne, G., "The Scattering of Polarized Light by Polydisperse Systems of Irregular Particles," Applied Optics, 9, 1113-21, (1970).

of bistatic measurements to detect non-spherical particles are discussed and optimal polarization strategies are considered on a qualitative basis.