THE APPLICATION OF STEADY STATE REMOTE SENSING FOR SUPPLEMENTING LIDAR RESULTS

R. W. L. Thomas
Wolf Research and Development Corporation
Riverdale, Md., U. S. A.

ABSTRACT

This paper presents the results of a theoretical study of both monostatic and bistatic steady state or "searchlight" experiments in order to determine their utility in comparison to and as a supplement to lidar experiments. The radiative transfer model employed was identical to a Monte Carlo model developed for lidar studies but resolution over time was removed. The bistatic cases treated included that of the telephotometer configuration, the wavelengths considered ranging from 3500 A° to 10,000 A°.

The results show that the loss of time resolution implies a significant increase in the effect of multiple scattering, particularly when scanning low altitude high density aerosols. As a consequence an inversion or extrapolation is required to convert results for different telescope fields of view into scattering matrix elements for given scattering angles. Errors caused by the single scattering assumption have been derived for a range of telescope fields of view and source beam divergences assuming an Elterman type vertical aerosol density distribution.

For the telephotometer case the functional form of the multiple scattering effect has been derived in terms of the scattering particle size parameters and shows a considerable increase as the particle size increases. Thus the variable aperture steady state experiment may provide useful information regarding the particle size distribution.