SUMMARY

In Chapter1, we discuss the Radiative transfer problem in detail. A description of the geometrical aspect of atmosphere and ocean and its parameters like extinction and absorption coefficients, Phase functions(OTHG, HG, TTHG, FF,), reflection and transmission functions for wind disturbed surface (Monte Carlo) have been taken up for study. Equations of transfer for non-polarized and polarized radiation field along with the boundary conditions for flat ocean surface and the bottom of the ocean
with the help of reflection and transmission matrix have been worked upon. A systematic approach towards determination of characteristic coefficients and reduction and modeling of the Radiative transfer equation in such system are dealt in detail.

In Chapter 2, we take up the task of solving the equation of transfer employing a new version of Chandrasekhar's discrete ordinate methods (DOM). Here we write the homogeneous version of the reduced Radiative transfer equations for atmosphere and ocean medium. We shall use the set of separated but coupled non-linear integro differential equations and for each component of stokes vector for discretization. We shall use Chandrasekhar discretization scheme to break the continuous radiation field into **2N** quadrature directions with corresponding weights keeping optical depth dependence exact, for $\mathbf{i,k} = \pm 1, \pm 2, \pm 3, \ldots, \pm N$. This enable us to form a set of n equations for each $\mathbf{i}$ (negative as well as positive). Each **homogeneous version of equations** is replaced by N equivalent equations, separated for positive and negative quadrature directions, with corresponding Gaussian weight functions expressed and interchanging the Gaussian summation with Fourier summation.
Computation for Eigen functions and Eigen values are worked upon in great detail along with the wind dependent albedo which finds a prominent place in further discussions.

In Chapter 3, we try to develop particular solution for the Radiative transfer equation. Here we proceed with the approach using a modified discrete ordinate method developed by C.E Siewert and accommodate for the inhomogeneous source term. The elementary solutions developed in the previous chapter is used to construct the green functions which in turn are required to find the particular solution i.e. to express it in terms of infinite-medium Green's function. The four boundary conditions are used to find the unknown constants. Finally the homogeneous solution added together with the particular solution found in this section gives the intensity of the Radiative transfer equation. We have established exact analytic forms of the polarized intensity from both the medium.

Chapter 4, deals with the computation of the positive and negative Eigen vectors along with the separation constants for various parameters as discussed under different sections for both the atmosphere and ocean. This section is also devoted towards meticulously found results of the four outgoing stokes parameters from ocean media for different directions.
Chapter 5 depicts the numerical results for certain specified dataset for atmosphere and ocean: