# Summary

This thesis is intended to solve the radiative transfer equations of the interlocked multiplet lines for anisotropically scattering medium. This thesis contains five chapters and three appendices and is organized as follows.

The chapter-1 is "General Introduction". At the beginning of this chapter,the focus is on "the interlocking problem in Radiative Transfer" and the formation of the general equation of the radiative transfer equations for m number of interlocked multiplet lines, following the radiative transfer equation for interlocked triplets by Woolley and Stibbs. Chandrasekhar's discrete ordinates method is discussed with the simplest form of a radiative transfer equation . Attempt has been made to list the different works on Radiative Transfer by using discrete ordinate methods, developed by Chandrasekhar and modified by different workers from time to time. Effort has also been made to enlist the works done by the different authors in connection with interlocked multiplet lines.

In Chapter-2, mentioning the azimuth free planetary phase function, the works of a few workers on Radiative Transfer where this phase function is used are focused. The chapter actually opens with an attempt to solve radiative transfer equation of the $r^{th}$ interlocked line involving the planetary phase function and the linear Planck function. The same equation with an exponential form of Planck function is also solved in this chapter.

In Chapter-3, the author tries to solve the radiative transfer equation of $r^{th}$ interlocked line from the set of m equations for interlocked multiplets of order m with two different phase functions. One is Rayleigh phase function and the other is Pomraning phase function. Some works of different astrophysicists by using these two phase functions are also mentioned.

The chapter-4 is concerned with the derivation of the diffusely reflected intensity and the emergent intensity from the radiative transfer equation of $r^{th}$ interlocked line with three term scattering indicatrix and the linear form of Planck function. A few works on Radiative Transfer by using the three terms scattering indicatrix are also highlighted in the chapter.

In chapter-5, the values of $H$-functions for doublet lines with or without interlocking are derived by approximating the $H$-functions following the technique of Abu-Shumays. The results are compared with those obtained by Busbridge and Stibbs as well as Karanjai and Deb by preparing tables and drawing graphs. The residual intensities for three different cases those chosen by Eddington as well as Busbridge and Stibbs are obtained and results are compared with those obtained by Eddington as well as Busbridge and Stibbs.

In appendix-I, a few words on H-functions for interlocked multiplets has been said.

In appendix-II, some identities are derived. These identities are used in different chapters of this thesis.

In appendix-III, an important identity is derived. This is used to derive an expression of the emergent intensity for the isotropic case.