SUMMARY OF THE CHAPTERS :

Chapter I.

In the first portion of this chapter we have given three approximate forms of the H-function. The forms are

1) $H(\mu,\omega) = 1 + \dfrac{\alpha\mu}{A + 2\mu}$; $A^2 = 1 - \omega$

$$\alpha = \omega A \exp\left[\omega(1+2|\omega - 0.5|)\right]$$

2) $H(\mu,\omega) = 1 + \dfrac{\alpha\mu}{A + 2\mu}$

$$\alpha = \frac{4\left[2(1 - A) - \omega\right]}{\omega\left(2 - A\log\frac{A+2}{A}\right)}$$

3) $H(\mu,\omega) = 1 + a\mu + b\mu^2$

a,b being functions of ω.

The forms 1) and 2) are suitable for easy numerical calculations in the region $0 \leq \omega \leq 0.9$. The third form, though not so good as the first and second one, gives results correct upto 3 places of decimals for the whole range of ω.

In the second portion we applied our approximate forms to calculate the line profiles with existing solutions of transfer equation.

Chapter II.

We applied the probabilistic method off Sobolev to solve the equation of transfer for interlocked multiplets. The solution is found to be of the same form as that of Busbridge and Stibbs. The profiles of Mg b lines have been calculated with this solution and also with a solution obtained by the consideration of scattering in each line to be coherent. The comparison shows that the interlocking effect to the line profile is negligible.

Chapter III.

In this chapter we solved the equation of transfer for the case of noncoherent scattering by Eddington's approximation method using a general approximate form for $\bar{J}(t)$, viz.

$$\bar{J}(t) = J_c + a\left[J_0(t) - J_c\right]$$

given by Geovenelli. From Table and graph (Table XVIII and fig 2) the results are found to differ from observations in the wing region. In an attempt to find better results we took $\bar{J}(t)$ as

$$\bar{J}(t) = J(t) = B_\nu(T) + \gamma/2 \left[pE_2(t) - p'E_3(t)\right]$$

given by DasGupta and showed that by varying γ, the line contour may be made to agree with the observation

Chapter IV.

The equation of transfer forthe case of noncoherent scattering has been solved using Eddington's ammended approximation viz.

$$K = (1/3)\ J.g(t)$$

where

$$g(t) = \left[1 - \frac{a \exp(- bt)}{c + t} \right]^{-1}$$

The contour of K line of Ca II calculated with our solution is found to be closer to the observation than that of Miyamoto.