Synopsis of the Chapters

In Chapter 0 we give the 'general introduction' which contains a short review of the physical basis of one-group and multi-group transport equations treated by various authors and of the different methods of solutions (approximate and exact) applied to their solutions.

In Chapter I, one-speed neutron transport equation in finite multiplying media is exactly and uniquely solved following Das Gupta's new technique based on Laplace transformation and Wiener-Hopf Technique. The emergent angular flux $\psi(0,\mu)$ and the angular flux $\psi(\gamma,\mu)$ at any optical depth γ together with the scalar neutron flux $\psi_0(\gamma)$ at any optical depth γ are determined. Criticality condition is deduced and the values of the critical length against the albedo w, are computed and given in a table, and compared with the same obtained by applying the eigen-function expansion method (Case and Zweifel, 1967, table 6.4, p. 158).

In chapter II Milne's time-dependent equation of transfer of imprisoned radiation in a gas in a finite passive medium is considered and exactly solved by a combination of Das Gupta's modified form of Wiener-Hopf Technique and method of solving boundary value problems in the theory of heat conduction as adopted by Chandrasekhar (1950) to solve the same equation approximately in combination with his method of discrete ordinate. Milne (1926) himself had earlier obtained an approximate solution of his equation.

In Chapter III we consider the neutron transport equation in an isotropically scattering plane-parallel finite medium with a plane and uniform point source. An exact solution to the equation is obtained by the method of Wiener-Hopf Technique.

In Chapter IV we have applied the method of Wiener-Hopf Tehhnique to obtain the Green's functions of one-group transport equation (with anisotropic unit plane source and with isotropic unit plane source) for a finite slab of passive and multiplying media. This problem had been treated by various authors adopting different (other) methods.