

## **ABSTRACT**

In this thesis numerical methods for solving first order and second order Transport equation are developed. These methods are developed by approximating the first order and second order spatial derivatives by fourth order finite difference approximation which gives a system of ordinary differential equations which is expressed in matrix vector form and a matrix exponential function by a fourth order rational approximation having distinct real poles. The solution of this system satisfies a recurrence relation. Then parallel algorithms are developed and tested for first order and second order Transport equation subject to homogeneous boundary conditions and non-homogeneous boundary conditions