

ABSTRACT

Shocks produced as a result of type Ia detonations in White Dwarfs can be replicated in astrophysical laboratories by using intense laser irradiation on dense plasma. This thesis aims to theoretically investigate the propagation of such shock waves in a degenerate plasma, having physical conditions similar to that of Helium-rich White Dwarfs. It is observed that one of the outcomes of strong laser application on a degenerate plasma, is the generation of a nonlinear force called relativistic Ponderomotive force. This force modifies the electron density distribution in such a way that the propagation of shock waves is also affected. Theoretical analysis is carried out by deriving and solving the Korteweg deVries Burger's Equation which models Shock waves. The results are then plotted in order to study the effects of Ponderomotive force and other parameters (e.g. viscosity) on the shock propagation.