Summary and Scope of Future Work

Summary

The propagation of shock waves through any media results in an instantaneous increase in pressure and temperature behind the shock wave. The scope of utilizing this sudden rise in pressure and temperature in new industrial, biological and commercial areas has been explored and the opportunities are tremendous. In this thesis we carried out following problems concerning to quasilinear hyperbolic partial differential equations. The solution of Riemann problem for dusty gas flow for four different initial data is constructed. Under certain conditions, the uniqueness and existence of the solution of the Riemann problem has been discussed. Finally interactions of elementary waves belonging to different families and same family are discussed.

The zeroth and first order solution of plane piston problem in a dusty gas in the presence of weak gravitational field is discussed with the help of perturbation method and similarity transformation. The zeroth order result represents the uniform flow which is affected by dust particles of the mixture without gravity. The first order

result shows the consequence of applied gravity in a dusty gas. The structure of the shock wave front is also discussed.

An analytical approach is used to derive the exact solution of Euler equations governing the problem of propagation of weak and strong shock wave in a one dimensional adiabatic flow in different gasdynamic regimes with generalized geometries. We assume that the density ahead of the shock front varies according to a power law. Also, the total energy carried by blast wave has been determined.

Scope of Future Work

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This section provides future work to consolidate the study presented in this thesis. The results obtained in this thesis are promising. However, improvement in the methods used for the solution of Euler's equations of gasdynamics can be proposed to find more general solutions. The key areas that can be focused for future research are identified here. In this thesis Riemann problem is constructed and solved only for one dimensional Euler's equations of gasdynamics. A more general method for the solution of Riemann problem for multi-dimensional system may be developed. The implementation of methodology and techniques studied for Riemann problem in this thesis for two dimensional Riemann problems for dusty gas is not trivial extension but can be implemented. Also using same technique we can solve Riemann problem for other media/ material.

The future scope of the plane piston problem studied in the thesis may be extended for higher dimensions and the results obtained here can be made more accurate by

obtaining higher order solutions. Also using same technique we can solve conical piston problem instead of plane piston problem. The method used here may be further improvised to get more general solution of the problem undertaken in the thesis. The method used for the exact solution of the one dimensional Euler's equations of gasdynamics may further be improved to get more realistic solution. Also, method used here may further be used for the solution of more complex systems.

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