

**SHOCK WAVE PROPAGATION IN A SELF-GRAVITATING
DUSTY GAS WITH MAGNETIC FIELD IN A ROTATING
MEDIUM**

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Abstract: This study investigates the propagation of exponential shock wave in a self-gravitating, rotating, perfectly conducting mixture of perfect gas and small solid particles (dusty gas) subjected to an axial or azimuthal magnetic field for both the adiabatic and isothermal flow conditions. The analysis incorporates the components of the vorticity vector, and both the isothermal and adiabatic compressibilities. In the present model, the solid particles are assumed to be continuously dispersed throughout the mixture, and flow equilibrium is maintained across the entire flow-field region behind the shock front. The impact of the variations in the physical parameters of the problem on the flow behavior is also investigated. It is worth to notice that, due to an increase in the gravitational parameter or the ratio of the solid-particle density to the initial gas density, the strength of the shock wave increases, while an increment in the adiabatic index or the shock Cowling number results reduction in the shock strength. The presence of an axial magnetic field enhances the shock strength in comparison to that of azimuthal magnetic field. Also, the shock wave is weaker in the isothermal flow condition as compared to the adiabatic flow condition.

Keywords and Phrases: Self-similar solution, shock waves, magnetogasdynamics, dusty gas, rotating medium, adiabatic and isothermal flows.

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