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Jump Conditions for a Relativistic Shock Propagating in a Resistive Medium

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Relativistic shocks possess a central role in energetic astrophysical phenomena, with gamma-ray bursts (GRBs) being a prominent example. This has led to the extensive investigation of the properties of shocks propagating in both non-magnetized and magnetized fluids characterized by infinite electrical conductivity. The derivation of the jump conditions for a relativistic shock propagating in a finite conductivity medium is presented. By the assumption of a relativistic equation of state for the shocked gas, its Lorentz factor in the unshocked medium's comoving frame may be determined and consequently its density, pressure, and electromagnetic field. Finally, the effects of the shocked medium's conductivity on its hydrodynamic quantities and electromagnetic field are investigated.

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