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Exact Analytical Solutions for Relativistic Parapotential Flow with Spatially Varying Total Energy[1] R. STOWELL, MIT, CHIPING CHEN, MIT — The relativistic cold fluid and Maxwell equations are solved exactly in steady state ($\frac{\partial}{\partial t} = 0$) for flows which are perpendicular to the electric field ($\mathbf{u} \cdot \mathbf{E} = 0$). The usual assumption (Creedon '75) that total energy ($q\phi + \gamma mc^2$) is independent of position is relaxed. The effect the energy profile on the density and velocity profiles is thus considered. Expressions are provided for the complete solution in terms of an arbitrary energy profile. Various geometries are treated. Applications include relativistic diodes and MILOs (magnetically insulated line oscillators).

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