EXACT RELATIVISTIC CHARGED STELLAR MODELS WITH PROBLEMS IN LINEAR PROGRAMMING

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In this work, we introduce a formal framework to derive interior solutions for the Einstein Maxwell system, describing the configuration of a relativistic charged fluid sphere within the context of spherically symmetric gravitational fields, which are matched to the exterior Reissner-Nordstrom space–time. Building upon previous methodologies, particularly the innovative approach by Komathiraj and Sharma (2018), we refine the process by reducing the system to a recurrence relation with variable rational coefficients. This enables us to obtain a solution in terms of an infinite series. We demonstrate that it is possible to closed form solutions within a specific range of model parameters. By imposing constraints on these parameters, we simplify the solutions to express them in terms of elementary functions, enhancing their accessibility and interpretability. The streamlined approach involves deriving solutions through series analysis and solving resulting difference equations, ultimately yielding expressions in the form of polynomials and products involving algebraic functions. Our study thus presents a comprehensive set of general solutions, offering insights into the behavior of charged fluid spheres in relativistic gravitational environments.

***Keywords**: Closed-form solution, Differential equation, Einstein-Maxwell system, Exact solutions, Frobenius method.*