MODEL OF COMPACT STAR VIA HYPERGEOMETRIC DIFFERENTIAL EQUATION

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In this research, for a static, spherically symmetric, anisotropic and charged distribution of matter, we present a new class of exact solutions to the Einstein-Maxwell system. This is achieved by assuming specific forms for one of the gravitational potentials, electric field intensity and measure of anisotropy. We transform the condition of pressure isotropy to a second order differential equation which is the master equation of the entire system by introducing new metric functions. This master equation of the Einstein-Maxwell system is reduced to a hypergeometric differential equation with the assistance of a transformation. It is then possible to find exact solutions which can be written explicitly in terms of elementary functions for specific values of model parameters involved. For some specific choices of the model parameters, the new class of solutions is shown to regain some of the previously reported realistic models of compact stars. We demonstrate that it is possible to express our class of solutions in a simple closed form so as to examine its physical viability for the studies of relativistic compact stars.

***Keywords**: Compact star, Einstein-Maxwell system, Pressure isotropy.*