Abstract ID: 027

CLASSES OF EXACT EINSTEIN- MAXWELL SOLUTIONS WITH PRESSURE ANISOTROPY

J. S. Manodya Hasanganee[a*] and K. Komathiraj[a]

[a]*Department of Mathematical Sciences, Faculty of Applied Sciences, South Eastern University of Sri Lanka, Sammanthurai, Sri Lanka.*

[*]*manodyahasangani@gmail.com*

Abstract

We present a new class of exact solutions to the Einstein-Maxwell system, for a static, spherically symmetric, anisotropic and charged distribution of matter. By assuming specific form for one of the gravitational potentials, electric field and measure of anisotropy, we transform the condition of pressure isotropy to a second order differential equation with the assistance of new independent and dependent variables. This master equation of the Einstein-Maxwell system which is to be solved to obtain the exact solutions. We consider two cases based on the model parameters involved in our system of equations. In the first case, we solve the equation by separation of variables method and obtain the solutions in terms of elementary functions explicitly. In the second case, we transform the master equation to a standard Bessel differential equation by introducing appropriate transformations. We show that a wide range of physically reasonable stellar solutions can be regained by suitable parametrization of the new class of solutions. We also present a new solution for particular parameter values and analyze physical viability of the solutions.

Keywords: *Exact Solutions, Einstein-Maxwell Equations, Relativistic Astrophysics*