New Solutions for Charged Gravitating Objects in EGB Gravity

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We explore Lovelock theories of gravity, particularly focusing on the Einstein-Gauss-Bonnet (EGB) gravity as an extension to general relativity. We consider a spacetime that is static and spherically symmetric. We generate field equations for charged gravitating perfect fluid leading to the charged condition of pressure isotropy that is an Abel differential equation of the second kind. By applying an appropriate transformation, we obtain new classes of exact solutions to the pressure isotropy equation. Some of the resulting solutions reduce to previously known solutions as special cases, while others represent new solutions. This work will not only provide new solutions into behaviour of highly dense stars but also establish a basis for future observational tests of these extended gravitational theories.