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Useful Predictions from the 5D Vacuum Equation

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Abstract. Since the work of Kaluza it has been known that Maxwell's equations are mathematically a subset of the Ricci curvature tensor in five dimensions. In the present paper a complete set of equations for the 5D Ricci curvature tensor is described that reproduces both the 4D Einstein gravitational equations and the equations of electromagnetism. The fifth row and column of 5x5 matrices of the Ricci tensor result in new parameters capable of generating 4D stress-energy-momentum tensors. We recall that using 5D vacuum equation no additional 5D stress-energy-momentum tensor is required. Solutions of the 5D vacuum equation $R_{ij=0}$ have been given the term 'induced matter theory.' A special feature of this theory is the occurrence of a scalar force field which is capable of generating mass. Three important exact solutions are addressed: the solution of the 5D vacuum equation for a charged mass, solutions without charges and electromagnetism but with gravity and the scalar field, and a static two mass solution also known as the '1-body metric.' Finally, geodesic motion trajectories in 4D-spacetime are calculated numerically using gravitational and scalar mass density components. Results are discussed and further work on more trajectory differences between the use of 4D and 5D formulations under electromagnetic influence is outlined.

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