

# SPHERICALLY SYMMETRIC STATIC FLUIDS IN ROSEN'S BIMETRIC THEORY OF GRAVITATION

G.S. KHADEKAR AND GOPAL KONDAWAR

DEPARTMENT OF MATHEMATICS, RTM NAGPUR UNIVERSITY  
MAHATMA JYOTIBA PHULE EDUCATIONAL CAMPUS, AMRAVATI ROAD  
NAGPUR-440033, INDIA  
E-MAIL: GKHADEKAR@REDIFFMAIL.COM

(Received 12 January 2006)

ABSTRACT. In this paper we have presented a procedure to obtain general exact analytical solutions of the field equations of Bimetric General Relativity (BGR) for a static spherically symmetric perfect fluid. The general analytical solution obtained depends on an arbitrary function of the radial coordinate. As illustrations of the procedure the exterior and interior Schwarzschild solutions are regained in BGR. The solutions agree with the Einstein general relativity (GR) for a physical system of the size of a solar system.

**AMS Classification:** 83D05

**Keywords:** Exact solution, Bimetric Relativity.

## 1. INTRODUCTION

Exact explicit solutions have played a crucial role in the development of many areas of physics and astrophysics. The first solution of Einstein's field equations of general relativity provided by Schwarzschild's (1916) [11], when he published details of the static, spherically symmetric vacuum metric that now bears his name. In particular case where a perfect fluid source for a static spherically symmetric gravitational field introduced, there have been many exact solutions given, although, to the best of our knowledge, the most general solution has not been obtained. Frequently, for mathematical convenience, computations are performed prior to imposing conditions on the reasonability of the equation of state, with the unfortunate consequence that the resulting fluid might very well be physical in only a local region of space-time, or indeed it might be unphysical everywhere. An alternative line of attack is first to impose an equation of state, and then to attempt to