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SOME NEW EXACT SOLUTIONS TO THE EINSTEIN EQUATIONS WITH MAGNETOFLUID

DR. S.S.UPADHYAY*

Declaration

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Abstract

Some new exact solutions to the Einstein equations with an acceleration free magnetofluid source are obtained. Some Physical restrictions on the solutions are presented. Models based on these solutions are found to have increasing entropy per baryon and not possess any flatness problem.

Introduction

The black hole solutions in gravity coupled to fields of different types have always drawn much attentions, in particular, a great interest in solutions of Einstein-Yang-Mills systems as presented by Yasskin (1995), Bais and Russell (1975), cho and freund (1975), Mazharimousavi and Halilsoy (2007), (2008), Bostani and Rehghani (2010) Dehghani and Bostani (2010). Recent develoments in string theory indicate that gravity may be truly higher dimensional theory, becoming effectively four dimensional (4D) at lower energies.

In this paper we study Einstein's field equations with an acceleration free imperfeet fluid source i.e. with perfect magnetofluid with the lotal evergy momentum tensor.

(1)$T^{\propto\beta} = (P + p + |b|2)\, u^{\propto} u^{\beta} + (p + \frac{1}{2}|b|2)g^{\propto\beta} - b^{\propto},b^{\beta}$

with

(2)$|b|2 = b_{\propto} b_{\propto}$

(3)$b^{\propto} u_{\propto} = 0$

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hence $b^{\propto}$ is spacelike magnetic vector and

(4)$|b|2 > 0$,

and the Maxwell equation reads

(5)$(u^{\propto} b^{\beta} - b^{\propto} u^{\beta})_{;\,\propto} = 0$.

The equation of relativistic magnetofluid dynamics are then the conservation of energy mornentum

(6)$T^{\propto\beta}; \propto = 0$,

the conservation of mass

(7) $(\rho u^{\propto})_{;\,\propto} = 0$,

and the relevant Maxwell equations

(8)$(u^{\propto} b^{\beta} - b^{\propto} u^{\beta})_{;\,\propto} = 0$,

together with equation of state

(9)$\rho = \rho\,(p, s)$,

where S be the entropy of the system. The adiabaticity condition reads

(10)$u^{\propto} s_{,\propto} = 0$.

we take the geometry to be spherically symmetric about a single point, and hence isotropic but not homogeneous at arbitrary times. The geometry is acceleration free

(11) $u^{\propto} u_{\beta;\,\propto} = 0$,

so that most general admissible metric assumes the form

(12)$ds^2 = - dt^2 + e^{2\lambda} dr^2 + y^2 (d\theta^2 + \sin^2\theta\, d\phi^2)$, where λ and y are functions of r and t only, while the fluid four-velocity vector reads

(13)$u_{\mu} = (-1, 0, 0, 0)$

So that the fluid is comoving with the geometry. Let us put

(14)$W = p + \frac{1}{2}|b|^2$

(15)$P = p + \frac{1}{2}|b|^2$

Such that eq.(1) reads

(16)$T^{\propto\beta} = (W + P)\, u^{\propto}u^{\beta} + P\, g^{\propto\beta} - b^{\propto}b^{\beta}$, showing that magnetic field increases density and pressure by $\frac{1}{2}|b|^2$.

Let us take magnetic field along r-direction ie $b_1 = b$ only ie

(17)$b_{\propto} = (0, b_1, 0, 0) = (0, b, 0, 0)$.

In this geometry the Einstoin equations assume the form

(18)$K W - kb^2 = \frac{1}{y^2} + 2\dot{\lambda}\frac{\dot{y}}{y} + \frac{\dot{y}^2}{y^2} - e^{-2\lambda}\left[2\frac{y''}{y^2} - 2\lambda'\frac{y''}{y} + \frac{y'^2}{y^2}\right]$,

(19)$KP = - \frac{1}{y^2} - 2\frac{\ddot{y}}{y} - \frac{\dot{y}^2}{y^2} + e^{-2y}\frac{y'^2}{y^2}$,

(20)$KP = - \ddot{\lambda} - \dot{\lambda}^2 - \frac{\dot{\lambda}\dot{y}}{y} - \frac{\ddot{y}}{y} + e^{-2\lambda}\left[\frac{y''}{y} - \lambda'\frac{y'}{y}\right]$,

(21)$\frac{\dot{y}'}{y} - \dot{\lambda}\frac{y'}{y} = 0$,

where

(22)$K = 8\pi G$.

The Bianchi identities give two constraints on the magnetofluid

(23)$W + \left(\dot{\lambda} + \frac{2\dot{y}}{y}\right)(W + P) = 0$, (24)$P' = 0$

One may abtain the solution of the form

$$(25)\ e^{\lambda} = \left| \frac{\lambda'}{\propto(r)} \right|$$

Where $\propto$ (r) is an integration function. Let us impose the boundary condition that the metric asymptofically approach a Robertson - walker one. In view of this asymptotic metric as $y = r\, e^{\lambda}$, $e^{\lambda} = R(t)/\ 1 + \frac{k}{4} r^2$,

where k = - 1, 0, 1 in an isotropic coordinate system the integration function

$$(26)\propto(r) = \frac{1 - kr^2/4}{1 + kr^2/4},$$

at all times. Hence, we get

$$(27)kw - kb^2 = \frac{1}{y^2 y'} \frac{\partial}{\partial r}[Y(1 - \alpha^2) + \dot{Y}^2 Y],$$

$$(28)K\,P = -\ \frac{1}{y^2}[1 - \alpha^2 + 2\,\ddot{Y}Y + \dot{Y}^2],$$

$$(29)K\,P = -\frac{1}{2\,y\,y'} \frac{\partial}{\partial r}\ [1 - \alpha^2 + 2\,\ddot{Y}Y + \dot{Y}^2],$$

2. Exact Inhomogeneous Solutions

Let us take the condition of vanishing of magnetic field, the fluid energy momentum tensor becomes traceless and we get

$$(30) \frac{\partial}{\partial r}\ [Y(1 - \alpha^2) +\ Y \frac{\partial}{\partial t} + (\dot{Y}Y)] = 0,$$

such that

$$(31) \qquad Y\ [1 - \alpha^2 + \frac{\partial}{\partial t}\ (\dot{Y}Y)] = \beta\ (t),$$

where β (t) be am arbitrary function of t. In general it is very difficult to obtain exact solutions for the metric asymptotic boundary condition. However, we have obtained some classes of solutions in particular cases. Let us consider the simplest case where the metric is asymptotically approaching a flat, k = 0, Robertson-Walker metric. For this case $\alpha(r) = 1$ and we obtain

$$(32) \qquad Y \frac{\partial}{\partial t}(\dot{Y}Y) = \beta\ (t)$$

The eq. (32) may be solved for some particular choices of β (t) and we are interested for solutions of the form

$$(33) \qquad Y = [\ f,\ (r)\ g,\ (t) + f_2\ (r)\ g,\ (t)]^{\frac{2}{3}}$$

where f_1 and f_2 are not proportional to each other. With our additional asymptotic condition that the metric becomes Robertson-walker at large times we have obtained four different solutions for the function Y (r,t) which will be published somewhere. One may also obtain in homogeneous solutions for

$$(34) \qquad \beta\ (t) = 0,$$

with k = 0, 1, and -1.

3. Entropy Production

For any physical system three thermodynamical conditions must be satisfied

(35)$(n u^{\mu})_{;\mu} = 0$

(36)$Td\left(\frac{S}{n}\right) = d\left(\frac{\rho}{n}\right) + pd\left(\frac{1}{n}\right)$,

(37)$S^{\mu}, \mu \geq 0$,

where n being particle number density, T as the temperature and S is the entropy density. For the radiation dominate universe

(38)$P(r, t) = a T^4 (r, t)$

and we get

(39) $\frac{S}{n} = \frac{4}{3} a^{1/4} \frac{\rho}{n}$

Again from eq. (35), one obtains

(40) $\frac{1}{(-g)^{1/2}} \partial t [(-g)^{1/2} n] = 0.$

so in our geometmy the number density gives

(41)$n(r, t) = \frac{n_0 (r)}{e^{\lambda} y^2}$,

where n0 (r) being integration function, and we get

(42)$S/n = \frac{4}{3} a^{1/4} e^{\lambda} y^2 \rho^{3/4}/n_0$.

Hence, the entropy per baryon of the universe inerease smoothly from zero to present time.

Concluding Remarks

We have persented some new exact solutions of Einstein equations with magnetofluid and vanishing of magneto fluid. These are exact inhomogeneous solations for $\beta(t) \neq 0$. The simplest case is $\propto (r) = 1$ and $b(t) \neq 0$. i.e. $y = [f_1(r) g_1 (t) + f_2(r) g_2 (t)]^{2/3}$.

We have obtained four set of solutions and that will be pubilshed somewher else. We have also presented inhomgeneous solutions for β (t) = 0, and this will be published in detail some where alse. At last we have investigated entropy production, showing that when $t \rightarrow \infty$, $(s/n) \rightarrow (s/n)_{RW}$. If shows that the entropy per baryon of the universe increases smoothly from zero to its present large values as the universe evolves from the big bang to the present time.

References

Bais, F.A. & Russell, R.J. (1975), Phys.Rev. D11,2692.
Bostani, N. & Dehghani, M.H. (2010), Mod. Phys. Lett. A25, 1507.
Cho, Y.M. & Freund, P.G.O. (1975), Phys. Rev. D12, 1588.
Mazharimousavi, S.H. & Halilsoy, M. (2007), Phys. Rev. D 76, 087501.
Mazharimousavi, S.H. & Halilsoy, M. (2008), JCAP, 0812.
Rehghani, M.H. & Bazrafshan, A. (2010), Int. J. Mod. Phys, D19, 293.
Yassken , P.B. (1775), Phys. Rev D/2, 2212.

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Appendix: Authors that employ mathematical modelling or complex statistics should place the mathematics in a technical appendix.

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