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Cosmological model to evaluate the present radius and density of the oscillating universe

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In 1997 it was shown that that the Universe is expanding with acceleration. Many models have been employed to explain this incident. Use of variable cosmological parameter was proposed by Hemantha and de Silva (2003) (2004). They wrote modified field equations in the form

$R^{\mu\nu} - \frac{1}{2}\bar{R}g^{\mu\nu} = \kappa T^{\mu\nu} - \Lambda g^{\mu\nu}$, where $= \frac{-8,G}{c^2}$

In this study a solution $R = l + d(1 - cos^3\alpha t)$ for the above equations was obtained. This model represents the Universe with deceleration, acceleration and again deceleration. The unknowns $,d,\alpha$ can be found under the following specified boundary conditions. According to the Big Bang theory, the radius of the Universe is zero at the beginning of the universe (this is the first boundary condition) so it can be chosen as $l = 0$.

In the literature it is found that the onset of acceleration took place at red shift is in between $1.2 - 1.6$. It was taken 1.3 for redshift in this study and the age of the Universe was considered as 13.7 billion years (this is the second boundary condition) and it gives $1.3 = (1 - cos^3\alpha t)$ and calculate $\alpha = 1.7348 \times 10^{-18}$ $\sim \supset /s^{-1}$.

It was considered the ratio $\frac{\Lambda'}{\rho} = \frac{7}{3}$ $(\Lambda' = \frac{\Lambda c^2}{8\pi G}\Lambda$ is the cosmological constant) for evaluating *d*. It was obtained $= 1.1829 \times 10^{28}\ cm$.

Finally, the radius of the Universe was obtained and the density of the Universe and the behavior of the radius of the Universe against the cosmic time was discussed. According to the results, the radius of the Universe at present epoch $R = 1.5376 \times 10^{28}\ cm$ and the Density of the Universe at present epoch $\rho = 1.5587 \times 10^{-29}\ gcm^{-3}$.

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