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Some properties of expanding universe with variable *lambda (Λ)*

E. L. N. L. Karunathilaka and K. D. W. J. Katugampala*

Department of Mathematics, University of Kelaniya, Sri Lanka.
wasantha@kln.ac.lk*

When the Universe is expanding, some of its properties radius, density, volume and total mass would be changed with cosmic time. Those changes can be obtained by using experimental data or solving suitable mathematical models related to the expansion of the Universe. The main purpose of this study is to obtain numerical values of significant properties of expanding Universe by using an appropriate model solution of R (radius of the Universe). Robertson Walker metric and Einstein's field equations were used as major equations to obtain expressions. This research has been initiated with the Robertson Walker metric in spherical polar coordinates, and it was mainly used to obtain the non-vanishing Christoffel symbols and Ricci tensor components to obtain expressions related to the calculations. Furthermore, all the calculations were depended on four-dimensional space-time coordinates. The pressure of the Universe is considered as zero, and the Universe is assumed to be spherical. Three boundary conditions were used to simplify the numerical values and to obtain expressions related to the properties of the Universe. Moreover, the total mass is a combination of dark matter and ordinary matter. Therefore, boundary conditions were used to separate that two matter masses. Then the values for radius, density, volume and total mass of the Universe were calculated as 1.138527×10^{28}cm, 1.4588×10^{-31}gcm^{-3}, 6.1787×10^{84}cm^3 and 9.0135×10^{53}g, respectively. Furthermore, ordinary matter mass was obtained as 2.7041×10^{53}g. These numerical values were similar to the available observed data of the Universe, and they can be used to explain the expansion evidence of the Universe. Hence, the used model solution and the selected redshift value can be used to explain these significant properties of the Universe. The redshift value 1.17 was satisfied the accelerating expansion of the Universe in the present epoch. However, the redshift value can be increased by modifying the solution model of R and then, can be obtained more accurate values. Moreover, this used model can explain not only the present epoch but also the past image and the future image of the Universe.

Keywords: Einstein's field equations, Properties of the Universe, Redshift, Robertson Walker metric