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Mini Review

Application of Cubic Formula for Freedman Equation

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Abstract

Various cosmological experimental and observational probes of BOOMERanG, NASA's WMAP and ESA's PLANCK mission revealed that the shape of our universe is flat. But till this day, there is no mathematical formulation for the geometry of our universe. In this short work, the author attempts to show that the geometry of our universe is Euclidean.

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Proof

The density parameter Ω, the curvature parameter k and the Hubble parameter H are related as [1-5].

$(1 - \Omega) = - kc^2 / H^2R^2$----------(1)

If omega less than 1, k is less than 1 If omega is equal to 1, k is zero

If omega greater than 1, k is +1.

If k is -1, the geometry of the universe is open,

If it is greater than one, the shape of the universe is closed and the universe obeys Euclidean geometry if k is equal to zero.

I.e. if Ω = 1, the universe is Euclidean,

If Ω = less than 1, the geometry of the universe is open, And if Ω = greater than 1, the universe is closed.

For our convenience, let us assume in (1), $- n = - kc^2 / H^2R^2$

So, $(1 - \Omega) = -$ n---------- (1a)

Applying (1a) and cubing (1) we get that, $1 - \Omega^3 - 3 \Omega (1 - \Omega) = - n^3$

i.e.$(n^3 - \Omega^{3)} + 1 - 3 \Omega (1 - \Omega) = 0$

By applying the famous algebraic cubic formula $a^3 - b^3 = (a-b)^3 + 3ab (a b)$ in the first factor of the above relation we obtain that,

$(n - \Omega)^3 + 3n \Omega (n - \Omega) = -1 + 3 \Omega (1 - \Omega)$

From (1a) we have , $n - \Omega = - 1$

Putting this relation in the above eqn. we have, $n (n - \Omega) = \Omega (1 - \Omega)$---------- (1b)

Again applying (1a) in RHS, $n (n - \Omega) = - n \Omega$---------- (2)

From (1a) we also have, $n - \Omega = -1$.

By assuming the above relation in the LHS of (2) we get $- n = -n \Omega$

By simplifying we get that $\Omega = 1$----------(3)

As we have previously noted the shape of our universe is flat if Ω is equal to one [1-5].

Discussion and Conclusion

But still there are problems. Theorists have to determine the global shape of our universe.

The global structure of the universes concludes its geometry plus topology. Cosmologists propose various models by using FLRW metric. It will take more and more refinements and advancements to furnish with the complete structures of our universe. Let

us recall that the famous French mathematician used to tell time and again that as long as algebra and geometry are not linked into one, we could not expect serious results. Considering this nice quote, the author applied the algebraic cubic formula to Freedman equation to find new result. Also, let us remember Einstein's view. Einstein told that differential equations entered into physics as a maiden servant but became a mistress. Special relativity is purely algebra plus geometry. But that is not the case with general relativity. Einstein wished to deduce many physical results in algebraic system. In this short work, the author attempts to follow both Lagrange's and Einstein's proposals.

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