

ASYMPTOTIC SOLUTION FOR SPATIALLY OPEN UNIVERSE WITH MATTER-DOMINATED EVOLUTION

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In Mijajlović et al. (2012), we applied the theory of regularly varying functions in the asymptotic analysis of cosmological parameters for the expanding universe. This analysis was based on the Friedmann equations, particularly on the so called *acceleration equation*. We have shown there that this equation can be put in the form

$$\ddot{a}(t) + \frac{\mu(t)}{t^2}a(t) = 0, \quad (1)$$

where $\mu(t)$ explicitly depends on the other two fundamental cosmological parameters, the energy density $\rho = \rho(t)$ and the pressure of the material in the universe $p = p(t)$. If the matter-dominated evolution of the flat universe is assumed, even for the non-zero cosmological constant Λ , we proved there that the expression $\mu(t)$ depends solely on the density parameter $\Omega(t)$:

$$\mu(t) = \frac{2}{9} \cdot \frac{3\Omega - 2}{1 - \Omega} \left(\ln \left(\frac{1 + \sqrt{1 - \Omega}}{\sqrt{\Omega}} \right) \right)^2. \quad (2)$$

Derivation of this formula is based on the formula for the age of the spatially flat universe with the cosmological constant Λ , due to Carroll et al. (1992), see also Liddle and Lyth (2000). In this paper we derive a similar formula to (2) for spatially open universe with matter-dominated evolution.

References

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