EQUATIONS OF MOTION OF THE UNIVERSE : A SINGLE GALAXY

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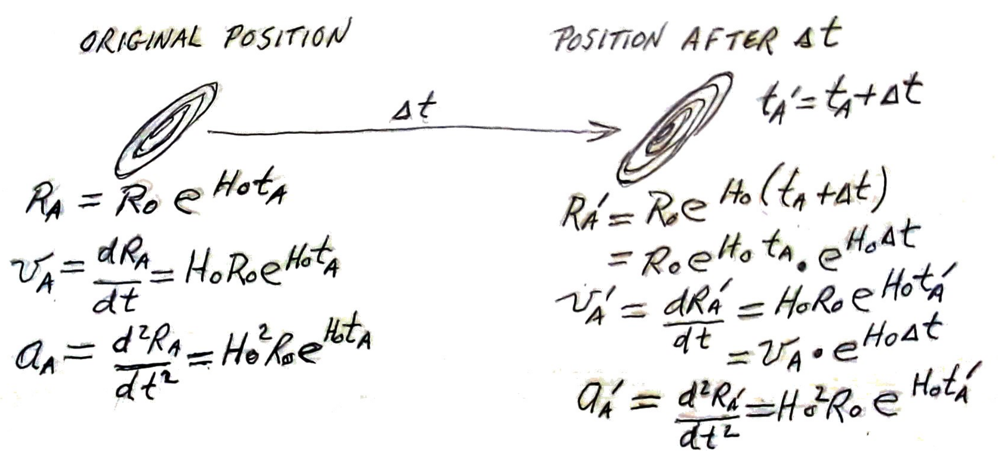
Understanding the movements of matter and space in the exponentially expanding (XPXP) universe requires a knowledge of exponential mathematics. It is an important premise of this theory that an XPXP universe cannot be described using common inertial math.

Nearly all galaxies participate in the proper cosmic expansion, the "Hubble flow", and obey the Hubble-LeMaitre Law: $dR/dt = H_oR$, leading to an exponential expression: $R = R_oe\text{^}H_ot$ (see H/L Law). Instantaneous position, velocity, and acceleration are derived from this simple relationship. A complete understanding of the motions of the universe is necessary to fully grasp the importance of XPXP.

Figure 30-1. THE DISPLACEMENT OF A PROPER GALAXY IN THE EXPANSION



- Note that a Maclaurin expansion of the exponential terms in Figure 1 yields approximate values of $R\sim(H_oR_o)t \sim C_ot$, and $v \sim(H_o^2R_o)t \sim H_oC_ot$. (see Maclaurin expansion) These approximations correspond to <u>distance = light speed x time</u>, and <u>velocity = acceleration x time</u> of the standard model.
- Multiplication by an expansion factor of $e\text{^}H_ot$ provides expressions for position, velocity and acceleration. Also, because H_ot is minuscule and $e\text{^}H_ot \sim e\text{^}0 = 1$, in "normal" situations, the exponential nature of the universe goes unnoticed.
- XPXP is ongoing and continuing, thereby producing an <u>accelerating universe</u>. This was a surprise to many when discovered in the late 20th century. No need for "dark energy". The proper universal acceleration is $(H_o^2R_o)\, e\text{^}H_ot = (H_oC_o)\, e\text{^}H_ot$. This conforms to the acceleration discovered in the late 20th century.