

186(5): Calculation of the Riemann Tensor

The Riemann tensor is defined by:

$$R^{\rho}_{\sigma\mu\nu} = \partial_{\mu}\Gamma^{\rho}_{\nu\sigma} - \partial_{\nu}\Gamma^{\rho}_{\mu\sigma} + \Gamma^{\rho}_{\mu\lambda}\Gamma^{\lambda}_{\nu\sigma} - \Gamma^{\rho}_{\nu\lambda}\Gamma^{\lambda}_{\mu\sigma} \quad - (1)$$

The only non-zero connection is:

$$\Gamma^0_{10} = -\frac{r_0}{4r(r-r_0)} \quad - (2)$$

Therefore in eq. (1):

$$\rho = 0, \nu = 1, \sigma = 0 \quad - (3)$$

and

$$R^0_{0\mu 1} = \partial_{\mu}\Gamma^0_{10} - \partial_1\Gamma^0_{\mu 0} + \Gamma^0_{\mu\lambda}\Gamma^{\lambda}_{10} - \Gamma^0_{1\lambda}\Gamma^{\lambda}_{\mu 0} \quad - (4)$$

The only possibility is:

$$\mu = 1 \quad - (5)$$

∴ which case:

$$R^0_{011} = 0 \quad - (6)$$

Conclusion

The cosmology of the solar system is described by:

$$T^0_{10} = -\frac{r_0}{4r(r-r_0)} \quad - (7)$$

and

$$R^{\rho}_{\sigma\mu\nu} = 0 \quad - (8)$$

∴ e it is completely described by Kosson