33 Reissner–Nordström Vectors

Displacement may be represented as a vector. Two types of displacement are “length scale” and “incremental distance”. Vectors representing each type act upon a common point. Ratios of components of each type may be related. Assume that the common point has vibration. Relating components will give the Reissner-Nordström metric.

Displacement Vectors;

Two 4D vectors of displacement share a common origin. One vector ($\boldsymbol{r}$) represents “length scale” and the other vector ($\boldsymbol{R}$) represents “incremental distance”. The vectors are defined as;

$$\boldsymbol{r} = r_1\boldsymbol{e_{11}} + r_2\boldsymbol{e_{12}} + r_3\boldsymbol{e_{13}} + r_4\boldsymbol{e_{14}}$$

$$\boldsymbol{R} = \partial R_1\boldsymbol{e_{21}} + \partial R_2\boldsymbol{e_{22}} + \partial R_3\boldsymbol{e_{23}} + \partial R_4\boldsymbol{e_{24}}$$

Where; $\boldsymbol{e_{n1}}$, $\boldsymbol{e_{n2}}$, $\boldsymbol{e_{n3}}$, $\boldsymbol{e_{n4}}$ are directional vectors (unit vectors) in 4D

(each vector has a unique frame of reference)

r_1 , r_2 , r_3 , r_4 are components of length

∂R_1 , ∂R_2 , ∂R_3 , ∂R_4 are components of incremental displacement

The vectors have magnitude; $|\boldsymbol{r}| = r_5$

$|\boldsymbol{R}| = \partial R_5$

The components are related to magnitudes; $r_1^2 + r_2^2 + r_3^2 + r_4^2 = r_5^2$

$\partial R_1^2 + \partial R_2^2 + \partial R_3^2 + \partial R_4^2 = \partial R_5^2$

Sub-components (r_6 , r_7 , r_8) and (∂R_6 , ∂R_7 , ∂R_8) are related as;

$r_6^2 = r_5^2 - r_4^2 = r_7^2 + r_3^2$ $\qquad$ $\partial R_6^2 = \partial R_5^2 - \partial R_4^2 = \partial R_7^2 + \partial R_3^2$

$r_7^2 = r_6^2 - r_3^2 = r_1^2 + r_2^2$ $\qquad$ $\partial R_7^2 = \partial R_6^2 - \partial R_3^2 = \partial R_1^2 + \partial R_2^2$

$r_8^2 = r_6^2 - r_1^2 = r_2^2 + r_3^2$ $\qquad$ $\partial R_8^2 = \partial R_6^2 - \partial R_1^2 = \partial R_2^2 + \partial R_3^2$

The Deformation Ratio;

A massive and charged object is assumed to deform surrounding space-time by a constant ratio (D);

$$D = r_8/r_7$$

Sub-components give;

$$r_6^2 = r_8^2 + r_1^2 = r_7^2 + r_3^2$$

$$r_8^2 = r_7^2 - r_1^2 + r_3^2$$

Giving; $D^2 = r_8^2/r_7^2 = 1 - r_1^2/r_7^2 + r_3^2/r_7^2$

The General Metric;

The general metric relates incremental components to the incremental magnitude;

$$\partial R_1^2 + \partial R_2^2 + \partial R_3^2 + \partial R_4^2 = \partial R_5^2$$

Vibration;

Assume that the object vibrates having a mean velocity of vibration (v_5); $v_5 = \partial R_5/\partial t_5$

Giving the "vibrational metric"; $\partial R_1^2 + \partial R_2^2 + \partial R_3^2 + \partial R_4^2 = v_5^2\partial t_5^2$

Deformation;

The constant ratio of deformation (D) is related to other ratios of deformation;

$$D = \partial t_5/\partial t = v_5/c = \partial R_1/\partial\lambda = \partial R_2/\partial U_\theta = \partial R_3/\partial U_\phi$$

Where; c is the light constant

$\partial\lambda$ is incremental wave-length ($\partial\lambda\partial f = c$)

∂f is incremental wave-frequency ($\partial f = 1/\partial T$)

∂t is "incremental particle time"

∂T is "incremental wave time"

U_θ is arc length associated with angle (θ)

U_ϕ is arc length associated with angle (ϕ)

The vibrational metric is;

$$\partial R_1^2 + \partial R_2^2 + \partial R_3^2 + \partial R_4^2 = v_5^2\partial t_5^2$$

Substituting with deformation gives the "wave-particle metric";

$$D^2\partial\lambda^2 + D^2\partial U_\theta^2 + D^2\partial U_\phi^2 + \partial R_4^2 = (D^2c^2)(D^2\partial t^2)$$

$$c^2\partial T^2 + \partial U_\theta^2 + \partial U_\phi^2 + \partial R_4^2/D^2 = D^2c^2\partial t^2$$

Arc-Length;

Two arc-lengths (U_θ , U_ϕ) are associated with angles (θ, ϕ);

$\theta = U_\theta/r$ and; $\phi = U_\phi/w$

$r\partial\theta = \partial U_\theta$ and; $w\partial\phi = \partial U_\phi$

Where; $w = r\sin(\theta)$ and; $z = r\cos(\theta)$

$y = w\sin(\phi)$ and; $x = w\cos(\phi)$

$x^2 + y^2 = w^2$ and; $w^2 + z^2 = r^2$ and; $x^2 + y^2 + z^2 = r^2$

The wave-particle metric may be written as;

$$c^2\partial T^2 + r^2\partial\theta^2 + r^2\sin^2(\theta)\partial\phi^2 + \partial R_4{}^2/D^2 = D^2c^2\partial t^2$$

Dimensions;

The particle dimensions of space-time are; (x, y, z, t) or $(r, \theta, \phi, -t)$

The wave dimensions of space-time are; (x, y, z, T) or $(r, \theta, \phi, -T)$

The Reissner-Nordström Metric;

The deformation ratio is; $D^2 = r_8{}^2/r_7{}^2 = 1 - r_1{}^2/r_7{}^2 + r_3{}^2/r_7{}^2$

Assume; $r_7 = r$ and: $r_3 = r_Q$ and: $r_1{}^2 = rr_S$

Where; r_Q is the electric length scale

r_S is the Schwarzschild radius

Giving; $D^2 = r_8{}^2/r_7{}^2 = 1 - r_S/r + r_Q{}^2/r^2$

Assume; $\partial R_4 = \partial r$

Giving the Reissner-Nordström metric; $c^2\partial T^2 + r^2\partial\theta^2 + r^2\sin^2(\theta)\partial\phi^2 + \partial r^2/D^2 = D^2c^2\partial t^2$

The Schwarzschild Metric;

If; $r_Q = 0$ Then; $D^2 = D_S{}^2 = 1 - r_S/r$

Giving the Schwarzschild metric; $c^2\partial T^2 + r^2\partial\theta^2 + r^2\sin^2(\theta)\partial\phi^2 + \partial r^2/D_S{}^2 = D_S{}^2c^2\partial t^2$

Conclusion;

Two types of displacement are “length scale” and “incremental distance”. Vectors representing each type act upon a common point giving the Reissner-Nordström metric.