C O N V E N T I O N S

Signature of the metric tensor g_{ab} : (- - - +), Riemann curvature tensor :

$$R^a_{bcd} = \Gamma^a_{bd,c} - \Gamma^a_{bc,d} + \Gamma^k_{bd}\Gamma^a_{ck} - \Gamma^k_{bc}\Gamma^a_{dk}$$

Ricci tensor : $R_{bc} = R^a_{bca} = R_{abcd}\, g^{ad}$,

Scalar curvature : $R = R^a_a = g^{ad} R_{ad}$,

Einstein tensor : $G_{ab} = R_{ab} - \frac{1}{2} R\, g_{ab}$,

Stress-energy-momentum tensor : T_{ab}

Einstein's gravitational field equation : $G_{ab} = - \frac{8\pi G}{c^4} T_{ab}$.

Units : We consider the centimetre as the unit of length and then choose the units of time and mass so as to give the velocity of light in free space C, and the constant of gravitation $\frac{8\pi G}{c^4}$ the value unity.

Note : Skew-symmetrization : $A_{ab} = \frac{1}{2}(A_{ab} - A_{ba})$,

Symmetrization : $A_{(ab)} = \frac{1}{2}(A_{ab} + A_{ba})$.

A semi-colon denotes the operation of co-variant differentiation. A comma denotes the operation of partial differentiation. Dot denotes projection of co-variant derivative along the flow vector i.e. $u_{a;b}\, u^b = \dot{u}_a$. C.C. denotes the complex conjugation of the preceeding term. An overhead bar on a

vector denotes complex conjugate of the corresponding vector
(scalar).

GLOSSARY OF SYMBOLS

Scalars :

C :   Velocity of light,

ρ^* :   Proper energy density of a fluid,

H :   Magnitude of the magnetic field vector,

$I_m \, \beta_1$:   Imaginary part of β_1,

p :   Proper hydrostatic pressure

$Re \, \beta_1$:   Real part of β_1,

μ :   Magnetic permeability,

σ :   Electrical conductivity.

Tensors :

C_{abcd} :   Weyl - Coformal tensor,

R_{abcd} :   Riemann Christofell curveture tensor,

$\{$:   Levi-Civita permutation symbol,

R_{ab} :   Ricci tensor,

E_{ab} :   Trace free electromagnetic energy momentum tensor,

F_{ab} :   Electromagnetic field tensor,

F^*_{ab} :   Dual of F_{ab} .

h_{ab} :   3-Dimensional projection operator,

$\gamma^{a}_{\ bc}$: Ricci coefficient of rotation,

σ_{ab} : Shear tensor of u_{a},

ω_{ab} : Rotation tensor of u_{a},

θ : Expansion of u_{a}.

Vectors :

Null complex tetrad z^{α}_{a}

$$z^{\alpha}_{a} = (1^{a},\ n^{a},\ m^{a},\ \bar{m}^{a}),$$

h_{a} : Space like unit vector,

H_{a} : Space like magnetic field vector,

J_{a} : Current vector,

1_{a} : Real null congruence,

n_{a} :   " "   " "   "

m_{a} : Complex null congruence,

u_{a} : Flow vector of matter,

$\dot{u}_{a}$: Acceleration vector.

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