1) 168(2): The Inhomogeneous Gravitational Equations.

These are:

$$\underline{\nabla} \cdot \underline{d} = \rho_m \quad - (1)$$

$$\underline{\nabla} \times \underline{h} - \frac{\partial \underline{d}}{\partial t} = \underline{J}_m \quad - (2)$$

The gravitational displacement is defined as

$$\underline{d} = \frac{1}{8\pi G} \underline{g} \quad - (3)$$

where $\underline{g}$ is the acceleration due to gravity, G is the Newton constant. The units of $\underline{d}$ are kg m^{-2} in analogy to the electric displacement $\underline{D}$ in units of C m^{-2}. Here ρ_m is the mass density in units of kilograms per cubic metre. In eq. (2) $\underline{h}$ is the gravitomagnetic field strength in units of kg $m^{-1} s^{-1}$ in analogy with the magnetic field strength $\underline{H}$ in units of C $s^{-1} m^{-1}$ or A m^{-1}. $\underline{J}_m$ is the mass current (density), in units of $c\rho_m$ = kg m $s^{-1} m^{-2}$ in analogy with the electric current density $\underline{J}$ (C $s^{-1} m^{-2}$).

In tensor format eqs. (1) and (2) are:

$$\partial_\mu K^{\mu\nu} = J_m^\nu \quad - (4)$$

for each a. Here:

$$J_m^\nu = \left(\rho_m, \frac{J_m}{c} \right) \quad - (5)$$

) and:

$$K^{\mu\nu} = \begin{bmatrix} 0 & -g_x & -g_y & -g_z \\ g_x & 0 & -h_z/c & h_y/c \\ g_y & h_z/c & 0 & -h_x/c \\ g_z & -h_y/c & h_x/c & 0 \end{bmatrix} \quad -(6)$$

The gravitational field tensor $K^{\mu\nu}$ is defined by:

$$K^{\mu\nu} = \left(\frac{c^2}{8\pi G}\right) g^{\mu\rho} g^{\nu\sigma} T_{\rho\sigma} \quad -(7)$$

where $T_{\rho\sigma}$ is the torsion and where

$$k = \frac{8\pi G}{c^2} = 1.86595 \times 10^{-26} \text{ m kg}^{-1} \quad -(8)$$

is the Einstein constant. So:

$$\boxed{K^{\mu\nu} = \frac{1}{k} g^{\mu\rho} g^{\nu\sigma} T_{\rho\sigma}} \quad -(9)$$

The metrics are gravitational metrics. In eq. (3), the factor $(8\pi G)^{-1}$ plays the role of ϵ_0 in electromagnetism. In analogy, $\underline{h}$ is related to the gravitomagnetic flux density $\underline{b}$, defined by

$$\underline{\nabla} \times \underline{g} + \frac{\partial \underline{b}}{\partial t} = \underline{0} \quad -(10)$$

$$\underline{\nabla} \cdot \underline{b} = 0 \quad -(11)$$

Therefore the units of $\underline{b}$ are s^{-1}. It follows

3) that
$$\underline{h} = \frac{c^2}{8\pi G}\,\underline{b} \quad -(12)$$
i.e.
$$\boxed{\underline{b} = k\,\underline{h}} \quad -(13)$$
Eq. (13) is analogous to:
$$\underline{B} = \mu_0 \underline{H} \quad -(14)$$
in electromagnetism.

$$\boxed{\begin{aligned} &\text{Therefore:} \\ &\underline{\nabla}\cdot\underline{b} = 0 \\ &\underline{\nabla}\times\underline{g} + \frac{\partial \underline{b}}{\partial t} = \underline{0} \\ &\underline{\nabla}\cdot\underline{d} = \rho_m \\ &\underline{\nabla}\times\underline{h} - \frac{\partial \underline{d}}{\partial t} = \underline{J}_m \\ &\underline{h} = \frac{1}{k}\underline{b} \ ; \quad \underline{d} = \frac{1}{c^2 k}\underline{g} \end{aligned}} \quad -(15)$$

The Newton law is:
$$\underline{\nabla}\cdot\underline{d} = \rho_m \quad -(16)$$

We have used the traditional definition of the Einstein constant k in eq. (8), but this ~~theory~~ is completely original. Finally g and $\underline{b}$ are related to gravitational scalar and vector potentials as in the next note.