68(1): ECE Theory of Gravity Induced Polarization Charges.

This is based on the homogeneous ECE field equations:

$$\underline{\nabla} \cdot \underline{B}^{(a)} = \mu_0 j^{(a)} \quad -(1)$$

$$\underline{\nabla} \times \underline{E}^{(a)} + \frac{\partial \underline{B}^{(a)}}{\partial t} = \mu_0 \underline{j}^{(a)} \quad -(2)$$

It has been shown in paper (46) onwards that eq. (2) may be written as:

$$\underline{\nabla} \times (n \underline{E}^{(a)}) + \frac{\partial}{\partial t}\left(\frac{\underline{B}^{(a)}}{n}\right) = \underline{0} \quad -(3)$$

where the refractive index n is defined as:

$$n^2 = \frac{c}{v} \quad -(4)$$

where v is the phase velocity.

The plane wave solution of eq. (3) is:

$$\underline{E}_1 = \frac{E^{(0)}}{\sqrt{2}}(\underline{i} - i\underline{j}) e^{i\phi_1} \quad -(5)$$

$$\underline{B}_1 = \frac{B^{(0)}}{\sqrt{2}}(i\underline{i} + \underline{j}) e^{i\phi_1} \quad -(6)$$

where:

$$\phi_1 = \frac{\omega}{n} t - nkz. \quad -(7)$$

The effect of gravity is to change

2)

$\underline{E}$ to $\underline{E}_1 = n\underline{E}$ and to change $\underline{B}$ to $\underline{B}_1 = \frac{\underline{B}}{n}$

It has been shown in previous papers that this produces the red-shift.

We have:

$$\text{Real } \underline{E}_1 = \frac{E^{(0)}}{\sqrt{2}} \left(\underline{i} \cos\phi_1 + \underline{j} \sin\phi_1 \right) \quad -(8)$$

and

$$\text{Real } \underline{E} = \frac{E^{(0)}}{\sqrt{2}} \left(\underline{i} \cos\phi + \underline{j} \sin\phi \right). \quad -(9)$$

It is seen that if:

$$\cos\phi_1 = a\cos\phi, \quad \sin\phi_1 = b\sin\phi \quad -(10)$$

then:

$$\boxed{\underline{E}_1 = \frac{E^{(0)}}{\sqrt{2}} \left(a\underline{i}\cos\phi + b\underline{j}\sin\phi \right)} \quad -(11)$$

For example, if $\phi = 45°$, $\phi_1 = 60°$, then $a = 1.414$, $b = 0.816$.

This means that if $\underline{E}$ is circularly polarized, as in eq (9), interaction with granular matter makes it elliptically polarized as in eq. (11). There is a change of polarization of E.M.