259(2): The Coulomb Law with Vacuum Potential: Spin Connection Resonance

In this case the relevant equations are:

$$\underline{\nabla} \cdot \underline{E}^a = \underline{\omega}^a{}_b \cdot \underline{E}^b - c\underline{A}^{(b)}(\text{vac}) \cdot \underline{R}^a{}_b(\text{orb}) \quad -(1)$$

where $\underline{A}^{(b)}(\text{vac})$ is the vacuum vector potential. The static electric field is defined by:

$$\underline{E}^a = -\underline{\nabla}\phi^a + \phi^b\underline{\omega}^a{}_b \quad -(2)$$

and there is the additional constraint:

$$\underline{\nabla} \times (\phi^b\underline{\omega}^a{}_b) = \phi^a\underline{\nabla} \times \underline{\omega}^a{}_b + (\underline{\nabla}\phi^b) \times \underline{\omega}^a{}_b = \underline{0} \quad -(3)$$

Therefore from eqs. (1) and (2):

$$\underline{\nabla} \cdot (-\underline{\nabla}\phi^a + \phi^b\underline{\omega}^a{}_b) = \underline{\omega}^a{}_b \cdot (-\underline{\nabla}\phi^b + \phi^c\underline{\omega}^b{}_c) - c\underline{A}^{(b)}(\text{vac}) \cdot \underline{R}^a{}_b(\text{orb}) \quad -(4)$$

i.e.

$$-\nabla^2\phi^a - \phi^c\underline{\omega}^a{}_b \cdot \underline{\omega}^b{}_c = -\underline{\nabla} \cdot (\phi^b\underline{\omega}^a{}_b) - \underline{\omega}^a{}_b \cdot \underline{\nabla}\phi^b - c\underline{A}^{(b)}(\text{vac}) \cdot \underline{R}^a{}_b(\text{orb}) \quad -(5)$$

So:

$$\nabla^2 \phi^a + (\underline{\omega}^a{}_b \cdot \underline{\omega}^b{}_c) \phi^c \quad -(6)$$

$$= \underline{\nabla} \cdot (\phi^b \underline{\omega}^a{}_b) + \underline{\omega}^a{}_b \cdot \underline{\nabla} \phi^b + c\underline{A}^{(b)}(\text{vac}) \cdot \underline{R}^a{}_b(\text{orb})$$

By the ECE antisymmetry law:

$$-\underline{\nabla} \phi^a = \phi^b \underline{\omega}^a{}_b \quad -(7)$$

so:

$$2\left(\nabla^2 \phi^a + (\underline{\omega}^a{}_b \cdot \underline{\omega}^b{}_c) \phi^c\right) = c\underline{A}^b(\text{vac}) \cdot \underline{R}^a{}_b(\text{orb}) \quad -(8)$$

This is the Euler - Bernoulli resonance equation:

$$\nabla^2 \phi^a + (\underline{\omega}^a{}_b \cdot \underline{\omega}^b{}_c) \phi^c = \frac{1}{2} c\underline{A}^b(\text{vac}) \cdot \underline{R}^a{}_b(\text{orb}) \quad -(9)$$

The left hand side contains the Hooke law term and the right hand side is the driving term originating in the vacuum. Eq. (9) is an undamped resonance equation. It is constrained by:

$$\underline{\nabla} \times (\phi^b \underline{\omega}^a{}_b) = \underline{0} \quad -(10)$$

Denote:

3) $$\rho^a(\text{vac}) = \frac{\epsilon_0 c}{2} \underline{A}^b(\text{vac}) \cdot \underline{R}^a{}_b(\text{orb}) \quad -(11)$$

Then:

$$\boxed{\nabla^2 \phi^a + (\underline{\omega}^a{}_b \cdot \underline{\omega}^b{}_c)\phi^c = \frac{\rho^a(\text{vac})}{\epsilon_0}} \quad -(12)$$

The left hand side in eq. (12) is a field property and the right hand side a material or vacuum property. The charge density could be due to an electron or the vacuum.

In the simplest case:

$$\nabla^2 \phi + \omega_0^2 \phi = \frac{\rho}{\epsilon_0}(\text{vac}) \quad -(13)$$

This produces undamped resonance if:

$$\nabla^2 \phi + \omega_0^2 \phi = \frac{\rho(\text{vac})}{\epsilon_0} = A \cos \omega t \quad -(14)$$

where A is a constant. The particular integral of eq. (14) is:

$$\phi = \frac{A \cos \omega t}{\omega_0^2 - \omega^2} \quad -(15)$$

Spin connection resonance occurs at:

$$\omega = \omega_0 \quad -(16)$$

when

$$\phi \to \infty \quad -(17)$$

If the condition (16) can be achieved experimentally then the electric field $\underline{E}$ becomes infinite even for an infinitesimally small driving force.

Note carefully that eq. (14) is a Helmholtz wave equation if ω_0^2 is a constant. The Helmholtz wave equation and Euler Bernoulli resonance equation have the same fundamental structure.

Therefore ECE theory is rigorously self consistent and produces spin connection resonance. The Helmholtz wave equation is similar in structure to the Schroedinger equation, which produces quantum tunnelling. So this theory can be related to the theory of low energy nuclear reactors.