355(4): Electric Field Strength Induced in a Circuit by Spacetime

This is defined by the Kambe equation:

$$\underline{\nabla} \cdot \underline{E}_F(\text{matter}) = q_F(\text{spacetime}) \quad -(1)$$

where:

$$q_F(\text{spacetime}) = \underline{\nabla} \cdot \left((\underline{v} \cdot \underline{\nabla}) \underline{v} \right) \quad -(2)$$

so:

$$\underline{E}_F(\text{matter}) = (\underline{v} \cdot \underline{\nabla}) \underline{v} \quad -(3)$$

and the electric field strength in volts per metre induced in the circuit is:

$$\underline{E}(\text{matter}) = \left(\frac{\rho_m}{\rho} \right)_{\text{matter}} \underline{E}_F(\text{matter}) \quad -(4)$$

So:

$$\boxed{\underline{E}(\text{matter}) = \left(\frac{\rho_m}{\rho} \right)_{\text{matter}} (\underline{v} \cdot \underline{\nabla}) \underline{v}} \quad -(5)$$

where ρ_m / ρ is the ratio of mass density to charge density in the circuit, and $\underline{v}$ is the velocity field of fluid spacetime.

From the vorticity equation:

$$\frac{D\underline{v}}{Dt} = \frac{\partial \underline{v}}{\partial t} + (\underline{v} \cdot \underline{\nabla}) \underline{v} = \frac{1}{2} \underline{\nabla} v^2 - \frac{1}{R} \left(\underline{\nabla} (\underline{\nabla} \cdot \underline{v}) + \nabla^2 \underline{v} \right) \quad -(6)$$

) where R is the Reynolds number of fluid spacetime. The differential equation of (6) must be solved with boundary conditions determined by the structure of the circuit.

This is a simple method of calculating the electric field strength E in volts per metre induced in a circuit by spacetime. The method uses only the ratio (m/ρ) (matter) and assumes that the spacetime surrounding the circuit is a fluid with velocity field $\underline{v}$.

Having found $\underline{v}$ from Eq. (6), the Kambe current of the spacetime is defined as:

$$\underline{J}_F = a_0^2 \, \underline{\nabla} \times (\underline{\nabla} \times \underline{v}) - \frac{\partial}{\partial t}\left((\underline{v} \cdot \underline{\nabla})\underline{v}\right) \quad -(7)$$

The Kambe magnetic field is defined by:

$$B_F = \underline{w} \quad -(8)$$

where $\underline{w}$ is the vorticity. It follows that:

$$\left(a_0^2 \, \underline{\nabla} \times \underline{B}_F - \frac{\partial \underline{E}_F}{\partial t}\right)_{\text{matter}} = \underline{J}_F(\text{spacetime})$$

$$-(9)$$

i.e. $$a_0^2 \left(\underline{\nabla} \times \underline{B}_F\right)_{\text{matter}} - \left(\frac{\partial \underline{E}_F}{\partial t}\right)_{\text{matter}}$$

$$= a_0^2 \, \underline{\nabla} \times \underline{\nabla} \times \underline{v} - \frac{\partial}{\partial t}\left((\underline{v} \cdot \underline{\nabla})\underline{v}\right) \quad -(10)$$

3) From eqs. (3) and (10):

$$\boxed{\underline{B}_F \text{ (matter)} = \underline{\nabla} \times \underline{v} \text{ (spacetime)}} \quad -(11)$$

So both $\underline{E}_F$ and $\underline{B}_F$ can be found in the circuit.

Finally:

$$\underline{B} \text{ (tesla)} = \frac{\rho_m}{\rho} \underline{B}_F \quad -(12)$$

so the magnetic flux density in the circuit is:

$$\boxed{\underline{B} \text{ (tesla)} = \frac{\rho_m}{\rho} \underline{\nabla} \times \underline{v}} \quad -(13)$$

where $\underline{v}$ is calculated from Eq. (6).

The advantage of this method is simplicity, and the fact that only ρ_m / ρ of the circuit is used. This quantity is known ~~experimentally~~.

As in UFT353 the Kambe electric field strength $\underline{E}_F$ can be expressed as:

$$\underline{E}_F = -\underline{\nabla}\, \Phi - \partial \underline{v} / \partial t \quad -(14)$$

where

$$\Phi = h + \phi - (\mu + \mu') \underline{\nabla} \cdot \underline{v} - \phi_1 \quad -(15)$$

and

$$\underline{\nabla}\, \phi_1 = \mu \nabla^2 \underline{v} \quad -(16)$$