MATHEMATICS 322
ASSIGNMENT 8
Due: November 04, 2015

01• Consider a source free solution:

$$E(t,x,y,z), \quad B(t,x,y,z)$$

of Maxwell's Equations. The components of E and B are real valued functions. The energy stands as follows:

$$\delta(t) = \frac{1}{2}\int_{\mathbf{R}^3} (E(t,x,y,z) \bullet E(t,x,y,z) + B(t,x,y,z) \bullet B(t,x,y,z)) m(dxdydz)$$

It is constant in time. Consider a homogeneous solution:

$$\gamma(t,x,y,z)$$

of the Wave Equation. Let it be real valued. The energy stands as follows:

$$\epsilon(t) = \frac{1}{2}\int_{\mathbf{R}^3} (\gamma_t(t,x,y,z)^2 + \|\nabla\gamma(t,x,y,z)\|^2) m(dxdydz)$$

It is constant in time. The components of E and B:

$$E = (\gamma_1, \gamma_2, \gamma_3), \quad B = (\gamma_4, \gamma_5, \gamma_6)$$

are homogeneous solutions of the Wave Equation. One would expect that:

$$\delta = \epsilon_1 + \epsilon_2 + \epsilon_3 + \epsilon_4 + \epsilon_5 + \epsilon_6$$

Is it true?