

$$\epsilon_1 = \sqrt{\chi(t')} + \chi(t')$$

$$\vec{E}(\vec{r}, t) = \vec{E}_0 R(\vartheta) A(z, t) \exp\{i(kz - \omega t)\}$$

$$\Delta \vec{E} - \frac{1}{c^2} \frac{\partial^2}{\partial t^2} \int_0^\infty \epsilon_1(t') E(\vec{r}, t-t') dt' = \frac{\epsilon_2}{c^2} \frac{\partial^2}{\partial t^2} |\vec{E}|^2 \vec{E}$$

$$A(z, t-t') = A - t' \dot{A} + \frac{1}{2} t'^2 \ddot{A}$$

$$A'' + i 2k A' + i 2kk' \dot{A} - (k'^2 + kk'') \ddot{A} = -\frac{\epsilon_2}{c^2} \omega^2 \alpha \quad (|A|^2 A)$$

$$\frac{1}{|A_0|} \frac{\partial A}{\partial t} = \frac{1}{t_0} \frac{\partial B}{\partial \tau}$$

$$\frac{1}{|A_0|} \frac{\partial A}{\partial z} = \frac{1}{z_0} \frac{\partial B}{\partial \xi} - \frac{1}{vt_0} \frac{\partial B}{\partial \tau}$$

$$\left. \begin{array}{l} \frac{1}{|A_0|} \left(\frac{\partial A}{\partial z} + \frac{1}{v} \frac{\partial A}{\partial t} \right) = \frac{1}{z_0} \frac{\partial B}{\partial \xi} \end{array} \right\}$$

$$\frac{\partial B}{\partial \tau} = q_0 B \frac{e^x - e^{-x}}{(e^x + e^{-x})} \Rightarrow \frac{\partial B}{\partial \tau^2} = -\frac{e B q_0^2}{(e^x + e^{-x})^2}$$

$$\frac{\partial B}{\partial \xi} = \frac{\hat{z}}{2} q_0^2 B \quad ; \quad |B|^2 B = q_0^2 \left(\frac{2}{e^x + e^{-x}} \right)^2 B$$