1. $\nabla\times\vec{H}=\varepsilon_0\varepsilon_r\frac{\partial\vec{E}}{\partial t}=\vec{J}+\varepsilon_0\frac{\partial\vec{E}}{\partial t}$

$m\frac{d\vec{u}}{dt}=q\vec{E}+\vec{u}\times\vec{B}$ $\longrightarrow$ $\begin{cases}\dot{V_x}=\frac{qB}{m}V_y+\frac{q}{m}E_x(y)\\ \dot{V_y}=-\frac{qB}{m}V_x\end{cases}$ $\longrightarrow$ $\begin{cases}\ddot{V_x}=-\frac{q^2B^2}{m^2}V_x\mp\frac{q}{m}\frac{\partial E_x(y)}{\partial t}\\ \ddot{V_y}=-\frac{q^2B^2}{m^2}V_y+\frac{q^2B}{m^2}E_x(y)\end{cases}$

(假设$\vec{E}$沿x轴，$\vec{B}$沿z轴)

解得：$V_x=V_\perp\cos(\omega_c t+\alpha)+V_{Dp}$

$V_y=\mp V_\perp\sin(\omega_c t+\alpha)+V_{DE}$

其中：$\omega_c=\frac{qB}{m}$. $V_{Dp}=\pm\frac{1}{\omega_c B}\dot{E_x}$，$V_{DE}=-\frac{E_x}{B}$.

沿电场方向的漂移速度.

$\vec{J}=nq\vec{v}_{Dp}=\frac{mn}{B^2}\frac{d\vec{E}}{dt}=\frac{\rho}{B^2}\frac{d\vec{E}}{dt}$ $\rightarrow$ 极化电流密度.

$\rightarrow\varepsilon_0\varepsilon_r\frac{\partial\vec{E}}{\partial t}=\left(\frac{\rho}{B^2}+\varepsilon_0\right)\frac{\partial\vec{E}}{\partial t}$

$\rightarrow\varepsilon_r=1+\frac{\rho}{\varepsilon_0B^2}$，$\rho$为等离子体密度.

2. $\vec{J}=\sigma\vec{E}$.

$\rightarrow\frac{\rho}{B^2}\frac{d\vec{E}}{dt}=\sigma\vec{E}$.

若$\vec{E}=E_0\cos\omega t\,\hat{i}$.

$\rightarrow-\frac{\rho}{B^2}\omega E_0\sin\omega t=\sigma E_0\cos\omega t$. $\rightarrow\sigma=-\frac{\rho}{B^2}\omega\tan\omega t$.