Concepts

概 念

主要概念与定义 Main concepts and definitionss

磁 场
Magnetic field

电流产生磁场，在闭合螺线管中，或在闭合磁路中电流产生的磁场为：

在这一个表式中，采用国际单位制，H为磁场强度，单位为安培/米(A/m)，N为匝数，I为电流，单位安培(A)，L为螺线管或磁路长度，单位为米(m)。

Current induces magnetic field. In spiral coils, the magnetic field (H) induced by current can be expressed as:

Where all parameters are in SI unit system and N is turn number, I (A) is current, I (m) is the length of the spiral coils.

$$H = \frac{NI}{L}$$

在磁芯中，加正弦波电流，可用有效磁路长度Le来计算磁场强度：

In magnetic core, the field strength H induced by alternate current can be calculated in term of the effective length le of the spiral coils:

$$H = \frac{\sqrt{2}IN}{Le}\ (A/m)$$

磁场的另一个单位为奥斯特（Oe），与安培/米（A/m）的关系为：

The other units of magnetic field is oersted(Oe),the relationship with the ampere per meter(A/m) can be expressed as:

$$1Oe = \frac{1 \times 10^3}{4\pi} \approx 79.58\ A/m$$

磁通密度、磁极化强度、磁化强度
Magnetic flux density, magnetic polarizability, magnetization.

在磁性材料中，加强磁场H时，引起磁通密度变化。其表现为：

B为磁通密度，亦称磁感应强度，J称磁极化强度，M称磁化强度，μ_0为真空磁导率，其值为$4\pi \times 10^{-7}$亨利/米(H/m)。

B、J单位为T，H、M单位为A/m，$1T=10^4\ Gs$。

Magnetic flux density, magnetic polarizability, magnetization. In magnetic material, the magnetic flux density varies as applied field H. It behaviors as:

Where B is magnetic flux density also called magnetic induction, J magnetic polarization,M magnetization,and μ0 vacuum permeability with the value of 4π×10^{-7} H/m. The units of B and J are Tesla (T) and those of H and M are A/m.

1 Tesla = 10^4 Gauss

$$B = \mu_0 H + J,\ B = \mu_0\ (H + M)$$

在磁芯中可用有效面积Ae来计算磁通密度：

正弦波为：

In magnetic cores, the magnetic flux density can be calculated using effective area Ae :

$$\hat{B} = \frac{0.225V}{fNAe}$$

电压单位V，频率单位为Hz，N为匝数， B单位为T，Ae单位为m^2。

Where V is electric potential in Volt, f frequency in Hz , N turn number, B in mT and Ae in m^2 .