

Concepts

概念

主要概念与定义 Main concepts and definitions

电感系数AL

Electric inductance factor AL

一个电感器或变压器，绕有N匝线圈，其电感值为L，则定义

The inductance value of an electric inductance or a transformer with N turn coils is L. It defines that

$$AL = \frac{L}{N^2}$$

当AL单位为nH/N²时，

这里L的单位为亨利，一般N取100，当N取得很大磁芯又是闭路时，不宜采用AL来表达，因可能进入谐振区或接近饱和区。

When the unit AL is nH/N², taking N=100 commonly, but sometimes the parameter of AL is not used, because when the turns of winding are too many and in circumstance of closed magnetic circuit the magnetic field is likely to enter resonance area or approach saturation area.

$$AL = \frac{L}{N^2} \cdot 10^{-9}$$

在设计中，知道AL值和设定要求的电感(nH)，则导线圈数：

这里C1为磁芯常数，单位为mm⁻¹，AL为nH/N²。AL值与气隙大小有关、磨削面精度有关。

where C1 of core parameters is mm⁻¹, AL is nH/N².

AL value is related to the size and surface roughness of the gap. If known AL value and magnetic core size, one can easily obtain permeability μ_i used material.

$$T_s = \left[\frac{\text{设定 } L(\text{nH})}{AL(\text{nH} / N^2)} \right]^{1/2}$$

在无隙情况下，
When without the gap,

$$\mu_i = \frac{C_1}{0.4\pi} AL$$

静磁场影响——直流迭加

Static field effect-DC superposition

当交流磁场与直流磁场同时作用于磁芯时，称为静磁场的影响，有时，简单地称为直流迭加。当磁芯有一个恒定的直流磁场H_{DC}，并在其上迭加一个幅度为 $\frac{\Delta H}{2}$ 的正弦磁场时，则表示

When an alternate field and a DC field act on a magnetic core simultaneously, it is called static magnetic influence. Sometimes it is called DC superposition.

When there is a sine field with the amplitude of $\Delta H/2$ acting on a DC field in the magnetic core, the applied fields is

$$H = H_{DC} + \frac{\Delta H}{2} \sin \omega t$$

当正弦磁场作用时，磁通密度形成小磁滞回线时，其峰值用 $\Delta B/2$ 表示，此时小磁滞回线在大磁滞回线内变化，小磁滞回线的平均斜率叫增量磁导率(前已述过)。

Due to sine field, the change of magnetic flux density shows a small hysteresis loop in the large one and its peak value is $\Delta B/2$ (See the following figures). The average slope of the small hysteresis loop is incremental permeability (as mentioned above):

$$\mu_{\Delta} = \frac{1}{\mu_0} \left[\frac{\Delta B}{\Delta H} \right]_{H_{DC}}$$