

【隐形专家按】这份音频输出变压器的简略算法学习笔记，先将音频输出变压器看成是理想变压器，再在计算上作调整，靠经验与打样将变压器的参数调整好，对初学者有一定帮助。

## 实例 1

我这里有一个音频变压器参数

输入 100V    A+B=6W    A+C=3W    A+D=1.5W

输出阻抗 4Ω    48\*17 骨架

他说喇叭的输出频率是 20-20K

## 注解

计算如下：

$$\text{铁心截面积} = 1.6 \times 1.7 = 2.72$$

$$\text{铁心有效截面积 } A_c = 1.6 \times 1.7 \times 0.96 = 2.61 \text{cm}^2$$

$$\text{初级匝数 } N_1 = \frac{U_1 \times 10^4}{4.44 \times B \times f \times A_c} = \frac{100 \times 10^4}{4.44 \times 1.4 \times 20 \times 2.72} = 2957 \approx 3000$$

$$\text{次级匝数 } N_2 = 1.15 \sqrt{\frac{N_1^2 \times Z_2 \times P_2}{U_1^2}} = 1.15 \frac{N_1}{U_1} \sqrt{Z_2 \times P_2} = 1.15 \frac{3000}{100} \sqrt{8 \times 6} = 239$$

$$\approx 240$$

$$\text{初级2匝数 } N_{1-2} = N_1 \sqrt{\frac{P_{\max}}{P_{1-2}}} - N_1 = 3000 \sqrt{\frac{6}{3}} - 3000 = 1243$$

$$\text{初级3匝数 } N_{1-3} = N_1 \sqrt{\frac{P_{\max}}{P_{1-3}}} - N_1 - N_{1-2} = 3000 \sqrt{\frac{6}{1.5}} - 3000 - 1243$$

$$= 1757$$

PRI: 3000T(0.14mm) + 1243T(0.10mm) + 1757T(0.10mm)

sec: 240T(0.45mm)

1.次级分 120+120 内外绕线(三明治)

2.绕不下时需改小线径;

您好 我还有三个问题请教:

- 1.初级圈数能否帮我计算一下,要有个过程,我以前没有计算过音频变压器,看了设计手册,明白一点,但不是很清晰,
- 2.另外就是绕线,如果圈数计算好后,是先绕 3W 1.5W 0.75W 还是 0.75W 1.5W 3W,有何问题,

3. 音频变压器上标‘C’是何意？

1. 匝数以工频变压器一样计算(B取低些)

2. 绕线从 3W--->0.75W 或从 0.75--->3W 都可以.

3. C 是 0V(相当于接地).

## 实例 2

麻烦你还请算一下给我看一看

就是以上参数 100V 1.5W 3W 6W 9.7Ω 41\*17 骨架

当 B 取 1.1 (可以吗) F 取 100 时

以你的方式计算(B=1.1 时):

PRI: 927+384+543T(0.16mm)

SEC: 71T/0.55mm

1. 927 是 6W 匝数.

2. 电流密度大约取 3~5, 我取的 3(因初级线有点细不好绕线).

3. 初级电流: 6W/100V=0.06A(实际不到 0.06A).

次级电流: 根号下 6/9.7=0.786A

## 注解

铁心截面积 = 1.3×1.7 = 2.21

铁心有效截面积  $A_c = 1.3 \times 1.7 \times 0.96 = 2.12 \text{cm}^2$

$$\text{初级匝数 } N_1 = \frac{U_1 \times 10^4}{4.44 \times B \times f \times A_c} = \frac{100 \times 10^4}{4.44 \times 1.1 \times 100 \times 2.21} = 927$$

$$\text{次级匝数 } N_2 = 1.15 \sqrt{\frac{N_1^2 \times Z_2 \times P_2}{U_1^2}} = 1.15 \frac{N_1}{U_1} \sqrt{Z_2 \times P_2} = \frac{927}{100} \sqrt{9.7 \times 6} = 71$$

$$\text{初级2匝数 } N_{1-2} = N_1 \sqrt{\frac{P_{\max}}{P_{1-2}}} - N_1 = 927 \sqrt{\frac{6}{3}} - 927 = 384$$

$$\text{初级3匝数 } N_{1-3} = N_1 \sqrt{\frac{P_{\max}}{P_{1-3}}} - N_1 - N_{1-2} = 927 \sqrt{\frac{6}{1.5}} - 927 - 384 = 543$$

$$\text{初级电流 } I_1 = \frac{P}{U_1} = \frac{6}{100} = 0.06 \text{--(a)}$$

$$\text{初级线径 } d_1 = 1.13 \sqrt{\frac{I_1}{J}} = 1.13 \sqrt{\frac{0.06}{3}} = 0.16 \text{--(mm)}$$

$$\text{次级电流 } I_2 = \sqrt{\frac{P}{Z_2}} = \sqrt{\frac{6}{9.7}} = 0.786 \text{--(a)}$$

$$\text{次级线径 } d_2 = 1.13 \sqrt{\frac{I_2}{J}} = 1.13 \sqrt{\frac{0.786}{3}} = 0.578 \approx 0.55 \text{--(mm)}$$

### 实例 3

麻烦你还请算一下给我看一看

就是以上参数  $U_1 = 100V, P_{\max} = 6w, P_3 = 3w, Z_2 = 8\Omega$  铁心 EI 41×16 工字形骨架

#### 注解

铁心截面积  $= 1.3 \times 1.6 = 2.08$

铁心有效截面积  $A_c = 1.3 \times 1.6 \times 0.96 = 2.0 - \text{cm}^2$

$$\text{初级匝数 } N_1 = \frac{U_1 \times 10^4}{4.44 \times B \times f \times A_c} = \frac{100 \times 10^4}{4.44 \times 0.94 \times 100 \times 2} = 1198 \approx 1200$$

$$\text{次级匝数 } N_2 = 1.15 \sqrt{\frac{N_1^2 \times Z_2 \times P_2}{U_1^2}} = 1.15 \frac{N_1}{U_1} \sqrt{Z_2 \times P_2} = 1.15 \frac{1200}{100} \sqrt{8 \times 6} = 96 \approx 97$$

$$\text{初级电流 } I_1 = \frac{P}{U_1} = \frac{6}{100} = 0.06 - (a)$$

$$\text{初级线径 } d_1 = 1.13 \sqrt{\frac{I_1}{J}} = 1.13 \sqrt{\frac{0.06}{5.5}} = 0.11 - (mm)$$

$$\text{次级电流 } I_2 = \sqrt{\frac{P}{Z_2}} = \sqrt{\frac{6}{8}} = 0.866 - (a)$$

$$\text{次级线径 } d_2 = 1.13 \sqrt{\frac{I_2}{J}} = 1.13 \sqrt{\frac{0.866}{4}} = 0.526 \approx 0.51 - (mm)$$

### 实例 4

麻烦你还请算一下给我看一看

就是以上参数  $U_1 = 100V, P_{\max} = 5w, P_3 = 3w, Z_2 = 8\Omega$  铁心 EI 41×16 工字形骨架

#### 注解

铁心截面积  $= 1.3 \times 1.6 = 2.08$

铁心有效截面积  $A_c = 1.3 \times 1.6 \times 0.96 = 2.0 - \text{cm}^2$

$$\text{初级匝数 } N_1 = \frac{U_1 \times 10^4}{4.44 \times B \times f \times A_c} = \frac{100 \times 10^4}{4.44 \times 0.625 \times 100 \times 2} = 1800$$

$$\text{次级匝数 } N_2 = 1.15 \sqrt{\frac{N_1^2 \times Z_2 \times P_{\max}}{U_1^2}} = 1.15 \frac{N_1}{U_1} \sqrt{Z_2 \times P_2} = 1.15 \frac{1800}{100} \sqrt{8 \times 5} = 131$$

$$\text{初级电流 } I_1 = \frac{P_{\max}}{U_1} = \frac{5}{100} = 0.05 \text{ --(a)}$$

$$\text{初级线径 } d_1 = 1.13 \sqrt{\frac{I_1}{J}} = 1.13 \sqrt{\frac{0.05}{5.5}} = 0.11 \text{ --(mm)}$$

$$\text{次级电流 } I_2 = \sqrt{\frac{P_{\max}}{Z_2}} = \sqrt{\frac{5}{8}} = 0.79 \text{ --(a)}$$

$$\text{次级线径 } d_2 = 1.13 \sqrt{\frac{I_2}{J}} = 1.13 \sqrt{\frac{0.79}{4}} = 0.511 \approx 0.51 \text{ --(mm)}$$

## 实例 5

麻烦你还请算一下给我看一看

就是以上参数  $U_1 = 220V, P_{\max} = 5w, U_2 = 10V$  铁心 EI 41×20 工字形骨架

## 注解

$$\text{铁心截面积} = 1.3 \times 2 = 2.6$$

$$\text{铁心有效截面积 } A_c = 1.3 \times 2 \times 0.96 = 2.5 \text{ --cm}^2$$

$$\text{初级匝数 } N_1 = \frac{U_1 \times 10^4}{4.44 \times B \times f \times A_c} = \frac{220 \times 10^4}{4.44 \times 0.59 \times 100 \times 2.5} = 3359 \approx 3370$$

$$\text{次级匝数 } N_2 = 1.05 \frac{N_1 \times U_2}{U_1} = 1.05 \frac{3370 \times 10}{220} = 160$$

$$\text{初级电流 } I_1 = \frac{P_{\max}}{U_1} = \frac{5}{220} = 0.023 \text{ --(a)}$$

$$\text{初级线径 } d_1 = 1.13 \sqrt{\frac{I_1}{J}} = 1.13 \sqrt{\frac{0.023}{5.5}} = 0.07 \approx 0.11 \text{ --(mm)}$$

$$\text{次级电流 } I_2 = \frac{P_{\max}}{U_2} = \frac{5}{10} = 0.5 \text{ --(a)}$$

$$\text{次级线径 } d_2 = 1.13 \sqrt{\frac{I_2}{J}} = 1.13 \sqrt{\frac{0.5}{4}} = 0.39 \approx 0.35 \text{ --(mm)}$$

## 实例 6

麻烦你还请算一下给我看一看

就是以上参数  $U_1 = 100V, P_{\max} = 10w, U_2 = 4.5V$  铁心 EI 48×17 工字形骨架

## 注解

铁心截面积 =  $1.6 \times 1.7 = 2.72$

铁心有效截面积  $A_c = 1.3 \times 2 \times 0.96 = 2.61 \text{ cm}^2$

$$\text{初级匝数 } N_1 = \frac{U_1 \times 10^4}{4.44 \times B \times f \times A_c} = \frac{100 \times 10^4}{4.44 \times 0.68 \times 100 \times 2.61} = 1269 \approx 1260$$

$$\text{次级匝数 } N_2 = 1.05 \frac{N_1 \times U_2}{U_1} = 1.05 \frac{1260 \times 4.5}{100} = 60 \approx 61$$

$$\text{初级电流 } I_1 = \frac{P_{\max}}{U_1} = \frac{10}{100} = 0.1 \text{ (a)}$$

$$\text{初级线径 } d_1 = 1.13 \sqrt{\frac{I_1}{J}} = 1.13 \sqrt{\frac{0.1}{5}} = 0.16 \approx 0.17 \text{ (mm)}$$

$$\text{次级电流 } I_2 = \frac{P_{\max}}{U_2} = \frac{10}{10} = 1 \text{ (a)}$$

$$\text{次级线径 } d_2 = 1.13 \sqrt{\frac{I_2}{J}} = 1.13 \sqrt{\frac{1}{2.5}} = 0.71 \approx 0.71 \text{ (mm)}$$

## 实例 7

麻烦你还请算一下给我看一看

就是以上参数  $U_1 = 100V / 8V, P_{\max} = 15w, P = 10w, Z_2 = 4\Omega$  铁心 EI 48×24 工字形

骨架

## 注解

铁心截面积 =  $1.6 \times 2.4 = 3.84$

铁心有效截面积  $A_c = 1.6 \times 2.4 \times 0.96 = 3.67 \text{ cm}^2$

$$\text{初级匝数 } N_1 = \frac{U_1 \times 10^4}{4.44 \times B \times f \times A_c} = \frac{100 \times 10^4}{4.44 \times 0.68 \times 100 \times 3.67} = 900$$

$$\text{次级匝数 } N_2 = 1.05 \sqrt{\frac{N_1^2 \times Z_2 \times P_2}{U_1^2}} = 1.05 \frac{N_1}{U_1} \sqrt{Z_2 \times P_2} = \frac{900}{100} \sqrt{4 \times 15} = 72 \approx 71$$

$$\text{次级匝数 } N_2 = \frac{N_1 \times U_2}{U_1} = 1.05 \frac{900 \times 8}{100} = 72 \approx 71$$

$$\text{初级2匝数 } N_{1-2} = N_1 \sqrt{\frac{P_{\max}}{P_{1-2}}} - N_1 = 900 \sqrt{\frac{15}{10}} - 900 = 202 \text{ -- 此处没设计}$$

$$\text{初级电流 } I_1 = \frac{P_{\max}}{U_1} = \frac{15}{100} = 0.15 \text{ --(a)}$$

$$\text{初级线径 } d_1 = 1.13 \sqrt{\frac{I_1}{J}} = 1.13 \sqrt{\frac{0.15}{4}} = 0.22 \approx 0.21 \text{ --(mm)}$$

$$\text{次级电流 } I_2 = \sqrt{\frac{P_{\max}}{Z_2}} = \sqrt{\frac{15}{4}} = 1.94 \text{ --(a)}$$

$$\text{次级线径 } d_2 = 1.13 \sqrt{\frac{I_2}{J}} = 1.13 \sqrt{\frac{1.94}{4.5}} = 0.74 \approx 0.72 \text{ --(mm)}$$

## 实例 8

麻烦你还请算一下给我看一看

就是以上参数  $U_1 = 100V / 11.5V, P_{\max} = 15w, Z_2 = 8\Omega$  铁心 EI 48×20 工字形骨架

## 注解

$$\text{铁心截面积} = 1.6 \times 2.0 = 3.2$$

$$\text{铁心有效截面积 } A_c = 1.6 \times 2.0 \times 0.96 = 3.07 \text{ cm}^2$$

$$\text{初级匝数 } N_1 = \frac{U_1 \times 10^4}{4.44 \times B \times f \times A_c} = \frac{100 \times 10^4}{4.44 \times 0.79 \times 100 \times 3.07} = 929 \approx 930$$

$$\text{次级匝数 } N_2 = 1.05 \sqrt{\frac{N_1^2 \times Z_2 \times P_2}{U_1^2}} = 1.05 \frac{N_1}{U_1} \sqrt{Z_2 \times P_2} = 1.05 \frac{930}{100} \sqrt{8 \times 15} = 107 \text{ --(按阻抗算)}$$

$$\text{次级匝数 } N_2 = \frac{N_1 \times U_2}{U_1} = 1.05 \frac{930 \times 11.5}{100} = 112 \text{ --(按电压算)}$$

$$\text{取两者平均值} = \frac{112 + 107}{2} = 110$$

$$\text{初级电流 } I_1 = \frac{P_{\max}}{U_1} = \frac{15}{100} = 0.15 \text{ --(a)}$$

$$\text{初级线径 } d_1 = 1.13 \sqrt{\frac{I_1}{J}} = 1.13 \sqrt{\frac{0.15}{4.5}} = 0.2 \approx 0.21 \text{ --(mm)}$$

$$\text{次级电流 } I_2 = \sqrt{\frac{P_{\max}}{Z_2}} = \sqrt{\frac{15}{8}} = 1.37 \text{ --(a)}$$

$$\text{次级线径 } d_2 = 1.13 \sqrt{\frac{I_2}{J}} = 1.13 \sqrt{\frac{1.37}{4.5}} = 0.62 \approx 0.57 \text{ --(mm)}$$

## 实例 9

麻烦你还请算一下给我看一看

就是以上参数  $U_1 = 100V / 9V, P_{\max} = 20w$  铁心 EI 48×17 王字形骨架

## 注解

铁心截面积  $= 1.6 \times 1.7 = 2.72$

铁心有效截面积  $A_c = 1.6 \times 2.0 \times 0.96 = 2.61\text{cm}^2$

$$\text{初级匝数 } N_1 = \frac{U_1 \times 10^4}{4.44 \times B \times f \times A_c} = \frac{100 \times 10^4}{4.44 \times 0.88 \times 100 \times 2.61} = 981 \approx 980$$

$$\text{次级匝数 } N_2 = \frac{N_1 \times U_2}{U_1} = 1.05 \frac{980 \times 9}{100} = 92.6 \approx 92 \text{ -- (按电压算)}$$

$$\text{初级电流 } I_1 = \frac{P_{\max}}{U_1} = \frac{20}{100} = 0.2 \text{ -- (a)}$$

$$\text{初级线径 } d_1 = 1.13 \sqrt{\frac{I_1}{J}} = 1.13 \sqrt{\frac{0.2}{5}} = 0.22 \approx \text{取 } 0.19 \text{ -- (mm)}$$

$$\text{次级电流 } I_2 = \frac{P}{U_2} = \frac{20}{9} = 2.2 \text{ -- (a)}$$

$$\text{次级线径 } d_2 = 1.13 \sqrt{\frac{I_2}{J}} = 1.13 \sqrt{\frac{2.2}{5}} = 0.75 \approx \text{取 } 0.67 \text{ -- (mm)}$$

## 实例 10

麻烦你还请算一下给我看一看

就是以上参数  $U_1 = 100V / 14V, P_{\max} = 25w, Z_2 = 8\Omega$  铁心 EI 48×24 工字形骨架

## 注解

铁心截面积  $= 1.6 \times 2.4 = 3.84$

铁心有效截面积  $A_c = 1.6 \times 2.4 \times 0.96 = 3.69\text{cm}^2$

$$\text{初级匝数 } N_1 = \frac{U_1 \times 10^4}{4.44 \times B \times f \times A_c} = \frac{100 \times 10^4}{4.44 \times 0.81 \times 100 \times 3.69} = 929 \approx 750$$

$$\text{次级匝数 } N_2 = 1.05 \sqrt{\frac{N_1^2 \times Z_2 \times P_2}{U_1^2}} = 1.05 \frac{N_1}{U_1} \sqrt{Z_2 \times P_2} = 1.05 \frac{750}{100} \sqrt{8 \times 25} = 111 \approx 106 \text{ -- (按阻抗)}$$

$$\text{次级匝数 } N_2 = \frac{N_1 \times U_2}{U_1} = 1.05 \frac{750 \times 14}{100} = 110 \text{ -- (按电压算)}$$

$$\text{取两者平均值} = \frac{111 + 110}{2} = 110 \text{ -- 取 } 106$$

$$\text{初级电流 } I_1 = \frac{P_{\max}}{U_1} = \frac{25}{100} = 0.25 \text{ --(a)}$$

$$\text{初级线径 } d_1 = 1.13 \sqrt{\frac{I_1}{J}} = 1.13 \sqrt{\frac{0.25}{4.5}} = 0.26 \approx 0.21 \text{ --(mm)}$$

$$\text{次级电流 } I_2 = \sqrt{\frac{P_{\max}}{Z_2}} = \sqrt{\frac{25}{8}} = 1.76 \text{ --(a)}$$

$$\text{次级线径 } d_2 = 1.13 \sqrt{\frac{I_2}{J}} = 1.13 \sqrt{\frac{1.76}{4.5}} = 0.7 \approx 0.57 \text{ --(mm)}$$

线径取得有点勉强

## 实例 11

麻烦你还请算一下给我看一看

就是以上参数  $U_1 = 100V / 13V, P_{\max} = 30w$  铁心 EI 48×17 王字形骨架

## 注解

铁心截面积  $= 1.6 \times 1.7 = 2.72$

铁心有效截面积  $A_c = 1.6 \times 2.0 \times 0.96 = 2.61 \text{ cm}^2$

$$\text{初级匝数 } N_1 = \frac{U_1 \times 10^4}{4.44 \times B \times f \times A_c} = \frac{100 \times 10^4}{4.44 \times 1.05 \times 100 \times 2.61} = 821 \approx \text{取} 820$$

$$\text{次级匝数 } N_2 = \frac{N_1 \times U_2}{U_1} = 1.05 \frac{820 \times 13}{100} = 113 \approx \text{取} 112 \text{ --(按电压算)}$$

$$\text{初级电流 } I_1 = \frac{P_{\max}}{U_1} = \frac{30}{100} = 0.3 \text{ --(a)}$$

$$\text{初级线径 } d_1 = 1.13 \sqrt{\frac{I_1}{J}} = 1.13 \sqrt{\frac{0.3}{6}} = 0.26 \approx \text{取} 0.21 \text{ --(mm)}$$

$$\text{次级电流 } I_2 = \frac{P}{U_2} = \frac{30}{13} = 2.3 \text{ --(a)}$$

$$\text{次级线径 } d_2 = 1.13 \sqrt{\frac{I_2}{J}} = 1.13 \sqrt{\frac{2.3}{6}} = 0.7 \approx \text{取} 0.67 \text{ --(mm)}$$

评注：电流密度取6，温升有点危险。

## 实例 12

麻烦你还请算一下给我看一看

就是以上参数  $U_1 = 100V / 16.5V, P_{\max} = 35w, Z_2 = 8\Omega$  铁心 EI 57×30 工字形骨架

## 注解



铁心截面积 =  $1.9 \times 3 = 5.7$

铁心有效截面积  $A_c = 1.9 \times 3 \times 0.96 = 5.47 \text{cm}^2$

$$\text{初级匝数 } N_1 = \frac{U_1 \times 10^4}{4.44 \times B \times f \times A_c} = \frac{100 \times 10^4}{4.44 \times 0.72 \times 100 \times 5.47} = 572 \approx \text{取} 572$$

$$\text{次级匝数 } N_2 = 1.05 \sqrt{\frac{N_1^2 \times Z_2 \times P_2}{U_1^2}} = 1.05 \frac{N_1}{U_1} \sqrt{Z_2 \times P_2} = 1.05 \frac{572}{100} \sqrt{8 \times 35} = 100 \approx 96 \text{ -- (按阻抗算)}$$

$$\text{次级匝数 } N_2 = \frac{N_1 \times U_2}{U_1} = 1.05 \frac{572 \times 16.5}{100} = 99 \text{ -- (按电压算)}$$

$$\text{初级电流 } I_1 = \frac{P_{\max}}{U_1} = \frac{35}{100} = 0.25 \text{ -- (a)}$$

$$\text{初级线径 } d_1 = 1.13 \sqrt{\frac{I_1}{J}} = 1.13 \sqrt{\frac{0.35}{4.5}} = 0.31 \approx \text{取} 0.29 \text{ -- (mm)}$$

$$\text{次级电流 } I_2 = \sqrt{\frac{P_{\max}}{Z_2}} = \sqrt{\frac{35}{8}} = 2.09 \text{ -- (a)}$$

$$\text{次级线径 } d_2 = 1.13 \sqrt{\frac{I_2}{J}} = 1.13 \sqrt{\frac{2.09}{4.5}} = 0.77 \approx \text{取} 0.72 \text{ -- (mm)}$$

## 实例 13

麻烦你还请算一下给我看一看

就是以上参数  $U_1 = 100\text{V} / 17.5\text{V}$ ,  $P_{\max} = 35\text{w}$ ,  $Z_2 = 8\Omega$  铁心 EI 48×24 工字形骨架

## 注解

铁心截面积 =  $1.6 \times 2.4 = 3.84$

铁心有效截面积  $A_c = 1.6 \times 2.4 \times 0.96 = 3.69 \text{cm}^2$

$$\text{初级匝数 } N_1 = \frac{U_1 \times 10^4}{4.44 \times B \times f \times A_c} = \frac{100 \times 10^4}{4.44 \times 0.87 \times 100 \times 3.69} = 701 \approx \text{取} 700$$

$$\text{次级匝数 } N_2 = 1.05 \sqrt{\frac{N_1^2 \times Z_2 \times P_2}{U_1^2}} = 1.05 \frac{N_1}{U_1} \sqrt{Z_2 \times P_2} = 1.05 \frac{700}{100} \sqrt{8 \times 35} = 123 \approx 125 \text{ -- (按阻抗算)}$$

$$\text{次级匝数 } N_2 = \frac{N_1 \times U_2}{U_1} = 1.05 \frac{700 \times 17.5}{100} = 129 \text{ -- (按电压算)}$$

$$\text{取两者平均值} = \frac{125 + 129}{2} = 127 \text{ -- 取} 125$$

$$\text{初级电流 } I_1 = \frac{P_{\max}}{U_1} = \frac{35}{100} = 0.35 \text{ --(a)}$$

$$\text{初级线径 } d_1 = 1.13 \sqrt{\frac{I_1}{J}} = 1.13 \sqrt{\frac{0.35}{4.5}} = 0.31 \approx \text{取} 0.23 \text{ --(mm)}$$

$$\text{次级电流 } I_2 = \sqrt{\frac{P_{\max}}{Z_2}} = \sqrt{\frac{35}{8}} = 2.09 \text{ --(a)}$$

$$\text{次级线径 } d_2 = 1.13 \sqrt{\frac{I_2}{J}} = 1.13 \sqrt{\frac{2.09}{4.5}} = 0.77 \approx \text{取} 0.57 \text{ --(mm)}$$

评注：线径取得太勉强了于铁心取的小有关。

## 实例 14

麻烦你还请算一下给我看一看

就是以上参数  $U_1 = 100V / 16.5V, P_{\max} = 40w$  铁心 EI 48×17 王字形骨架

## 注解

$$\text{铁心截面积} = 1.6 \times 1.7 = 2.72$$

$$\text{铁心有效截面积 } A_c = 1.6 \times 2.0 \times 0.96 = 2.61 \text{cm}^2$$

$$\text{初级匝数 } N_1 = \frac{U_1 \times 10^4}{4.44 \times B \times f \times A_c} = \frac{100 \times 10^4}{4.44 \times 1.27 \times 100 \times 2.61} = 679 \approx \text{取} 680$$

$$\text{次级匝数 } N_2 = \frac{N_1 \times U_2}{U_1} = 1.05 \frac{680 \times 16.5}{100} = 118 \approx \text{取} 115 \text{ --(按电压算)}$$

$$\text{初级电流 } I_1 = \frac{P_{\max}}{U_1} = \frac{30}{100} = 0.3 \text{ --(a)}$$

$$\text{初级线径 } d_1 = 1.13 \sqrt{\frac{I_1}{J}} = 1.13 \sqrt{\frac{0.3}{6}} = 0.26 \approx \text{取} 0.23 \text{ --(mm)}$$

$$\text{次级电流 } I_2 = \frac{P}{U_2} = \frac{30}{16.5} = 1.82 \text{ --(a)}$$

$$\text{次级线径 } d_2 = 1.13 \sqrt{\frac{I_2}{J}} = 1.13 \sqrt{\frac{1.82}{6}} = 0.62 \approx \text{取} 0.51 \text{ --(mm)}$$

评注：电流密度取 6，温升有点危险。

## 实例 15

麻烦你还请算一下给我看一看

就是以上参数  $U_1 = 100V / 13.5V, P_{\max} = 45w, Z_2 = 4\Omega$  铁心 EI 66×32 工字形骨架

### 注解

铁心截面积  $= 2.2 \times 3.2 = 7.04$

铁心有效截面积  $A_c = 2.2 \times 3.2 \times 0.96 = 6.76\text{cm}^2$

$$\text{初级匝数 } N_1 = \frac{U_1 \times 10^4}{4.44 \times B \times f \times A_c} = \frac{100 \times 10^4}{4.44 \times 0.724 \times 100 \times 6.76} = 460 \approx \text{取} 460$$

$$\text{次级匝数 } N_2 = 1.05 \sqrt{\frac{N_1^2 \times Z_2 \times P_2}{U_1^2}} = 1.05 \frac{N_1}{U_1} \sqrt{Z_2 \times P_2} = 1.05 \frac{460}{100} \sqrt{4 \times 45} = 65 \approx 63 \text{ -- (按阻抗算)}$$

$$\text{次级匝数 } N_2 = \frac{N_1 \times U_2}{U_1} = 1.05 \frac{460 \times 13.5}{100} = 65 \text{ -- (按电压算)}$$

$$\text{取两者平均值} = \frac{65 + 65}{2} = 65 \text{ -- 取} 63$$

$$\text{初级电流 } I_1 = \frac{P_{\max}}{U_1} = \frac{45}{100} = 0.45 \text{ -- (a)}$$

$$\text{初级线径 } d_1 = 1.13 \sqrt{\frac{I_1}{J}} = 1.13 \sqrt{\frac{0.45}{3}} = 0.44 \approx \text{取} 0.41 \text{ -- (mm)}$$

$$\text{次级电流 } I_2 = \sqrt{\frac{P_{\max}}{Z_2}} = \sqrt{\frac{45}{4}} = 3.35 \text{ -- (a)}$$

$$\text{次级线径 } d_2 = 1.13 \sqrt{\frac{I_2}{J}} = 1.13 \sqrt{\frac{3.35}{4}} = 1.02 \approx \text{取} 1.0$$