

LLC计算步骤:

$$P_o := 270W$$

$$V_{i\_n\_max} := 400V$$

$$V_{i\_n\_min} := 300V$$

$$V_{i\_n\_normal} := 360V$$

$$V_o := 12V$$

$$V_{of} := 0.7V$$

$$F_r := 100KHz$$

$$R_L := \frac{V_o^2}{P_o} = 0.533\Omega$$

1计算理论变比

$$N := \frac{V_{i\_n\_normal}}{2(V_o + V_{of})} = 14.173$$

选择变比N

$$N := 14$$

2计算最高、最低输入电压增压Mmin、Mmax

$$M_{min} := \frac{2 \cdot N \cdot (V_o + V_{of})}{V_{i\_n\_max}} = 0.889$$

$$M_{max} := \frac{2 \cdot N \cdot (V_o + V_{of})}{V_{i\_n\_min}} = 1.185$$

$$M_{normal} := \frac{2 \cdot N \cdot (V_o + V_{of})}{V_{i\_n\_normal}} = 0.988$$

3选取k计算Q

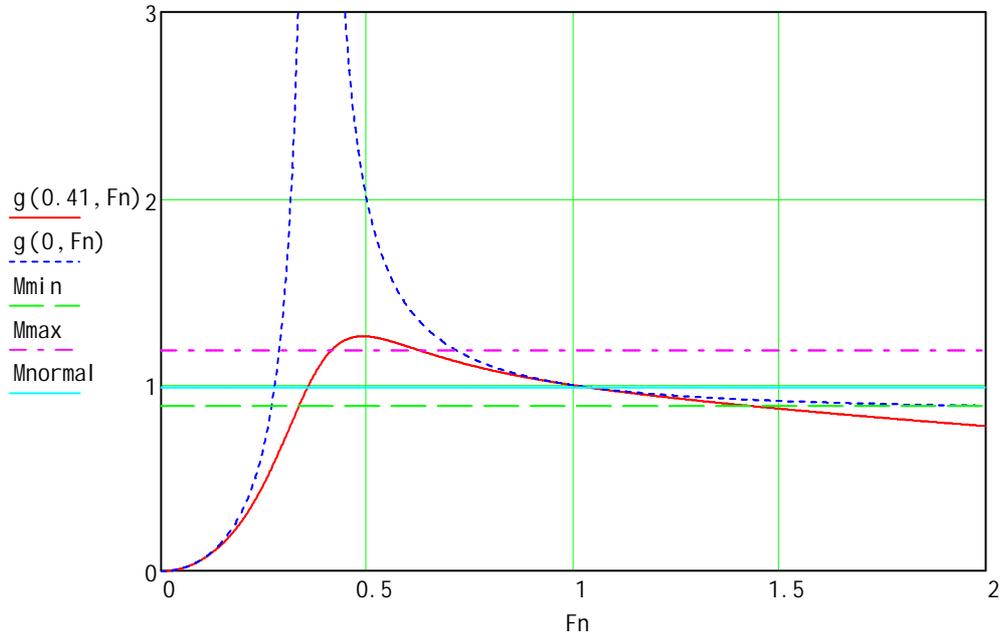
$$\text{Assume } k=Lm/Lr \quad k := 6$$

$$Q_{max} := \frac{1}{k \cdot M_{max}} \cdot \sqrt{k + \frac{M_{max}^2}{M_{max}^2 - 1}}$$

$$Q := 0.95 \cdot Q_{max} = 0.411$$

4计算工作频率

$$g(q, F_n) := \frac{1}{\sqrt{\left[1 + \frac{1}{k} \left(1 - \frac{1}{F_n^2}\right)\right]^2 + q^2 \cdot \left(F_n - \frac{1}{F_n}\right)^2}}$$



输入电压最小，满载时，即Q为0,41时，工作频率最小

$$f_{min} := \frac{Fr}{\sqrt{1 + k \cdot \left(1 - \frac{1}{M_{max}^2}\right)}} = 6.053 \times 10^4 \frac{1}{s}$$

输入电压最大，满载时，即Q为0,41时，工作频率为

$$f_{mid} := 140kHz$$

输入电压最大，空载时，即Q为0时，工作频率最大

$$f_{max} := \frac{Fr}{\sqrt{1 + k \cdot \left(1 - \frac{1}{M_{min}^2}\right)}} = 1.997 \times 10^5 \frac{1}{s}$$

5. 计算Lr、Lm、Cr

$$R_{ac} := \frac{8 \cdot N^2 \cdot (V_o + V_{of})^2}{\pi^2 \cdot P_o} = 94.905 \Omega$$

$$Z_o := Q \cdot R_{ac} = 39.01 \Omega$$

$$L_r := Z_o \div (2\pi \cdot Fr) = 6.209 \times 10^{-5} H$$

$$C_r := \frac{1}{4 \cdot \pi^2 \cdot L_r \cdot F_r^2} = 4.08 \times 10^{-8} \text{F}$$

$$L_m := k \cdot L_r = 3.725 \times 10^{-4} \text{H}$$