EE160 Lab Assignment-6

Lab section 1A

Open and Short Circuit Test of a Transformers

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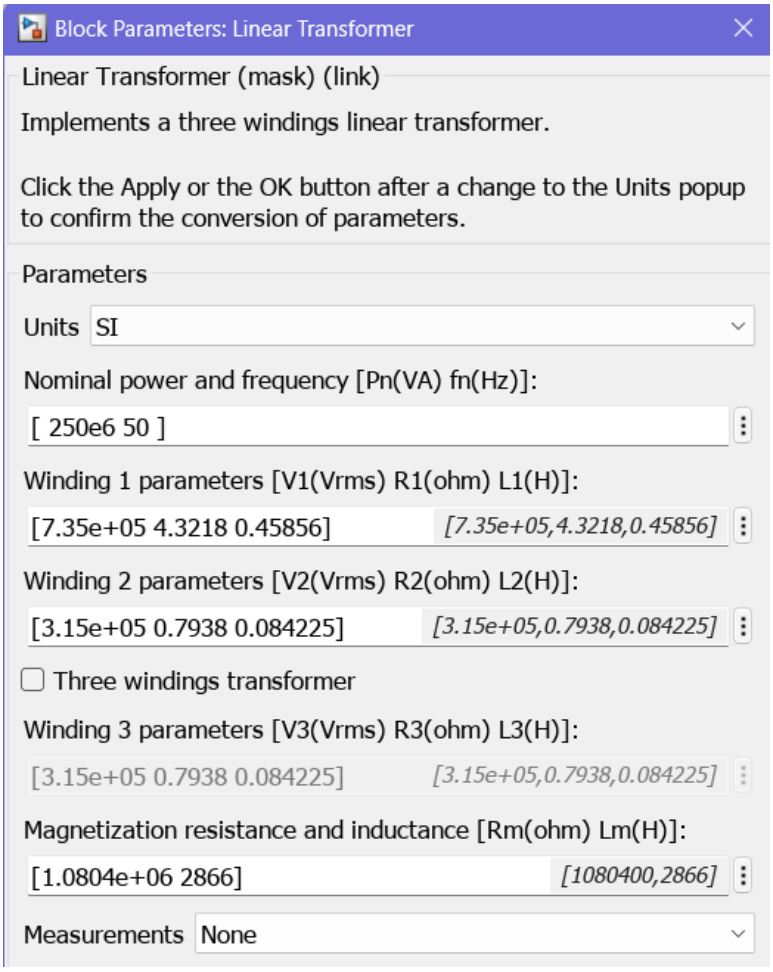
Objectives:

Perform Open and Short circuit test to find out the value of R_C , X_M ,R_{Eq} , X_{Eq} and Estimate the value of resistance and reactance of the primary and secondary windings respectively, *i.e.*, R_P, X_P, R_S, X_S.

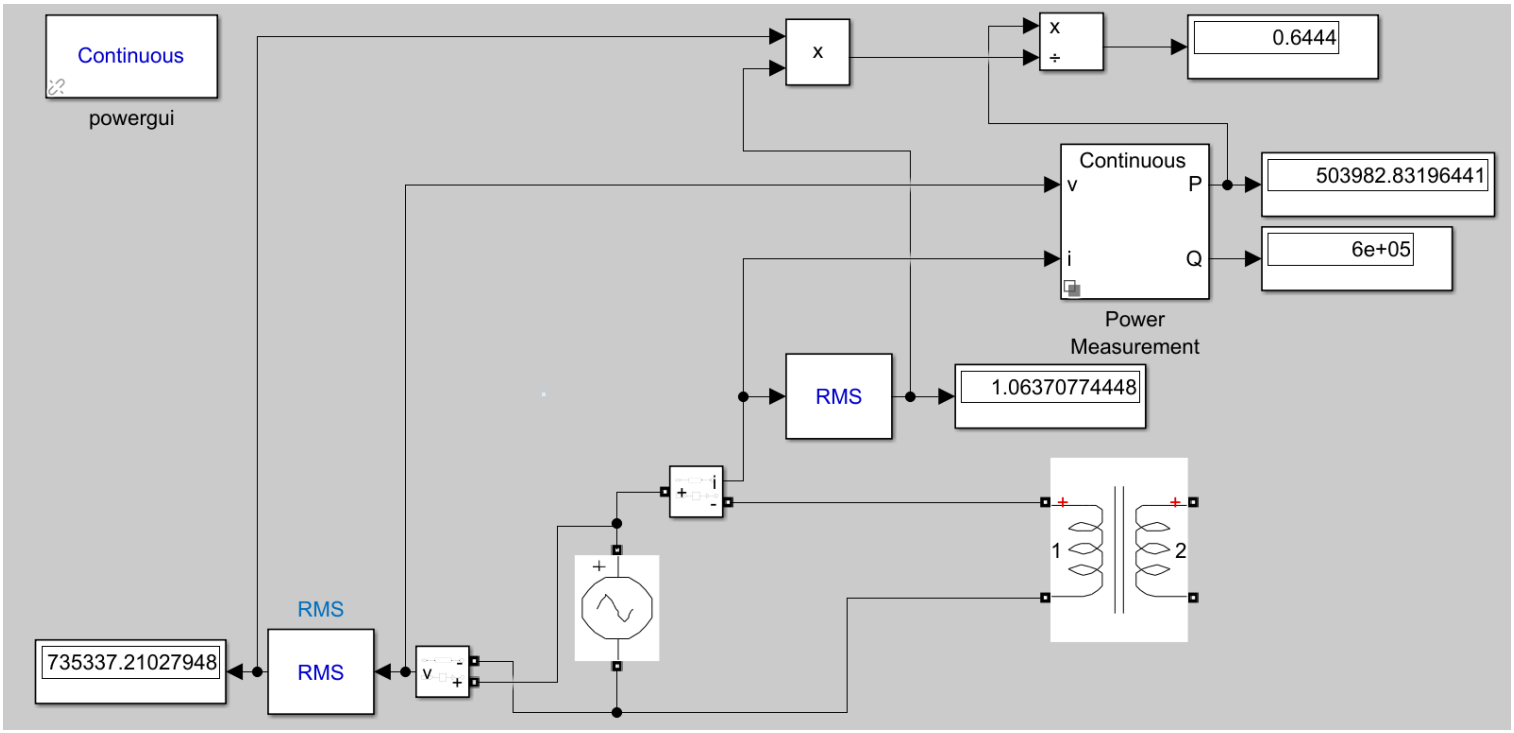
Parameters for Open Circuit Test :

Input voltage = (7.35e+05)*sqrt(2) V
Frequency = 50Hz

Transformer Parameters :



Open Circuit :



Power Factor = cos θ = $P_{OC}/(V_{OC} \times I_{OC})$
= 0.64432

Admittance Y_E = $(I_{OC} / V_{OC}) \angle -\theta$ mho
= 1.4465×10^{-6} mho
= (1/1079951.15) + j (1/903995.66) mho

R_C = 1079951.15 ohm
X_M = 903995.66
That means L_M = 903995.66 / $2\pi f$ = 2877.05 H

Verification:

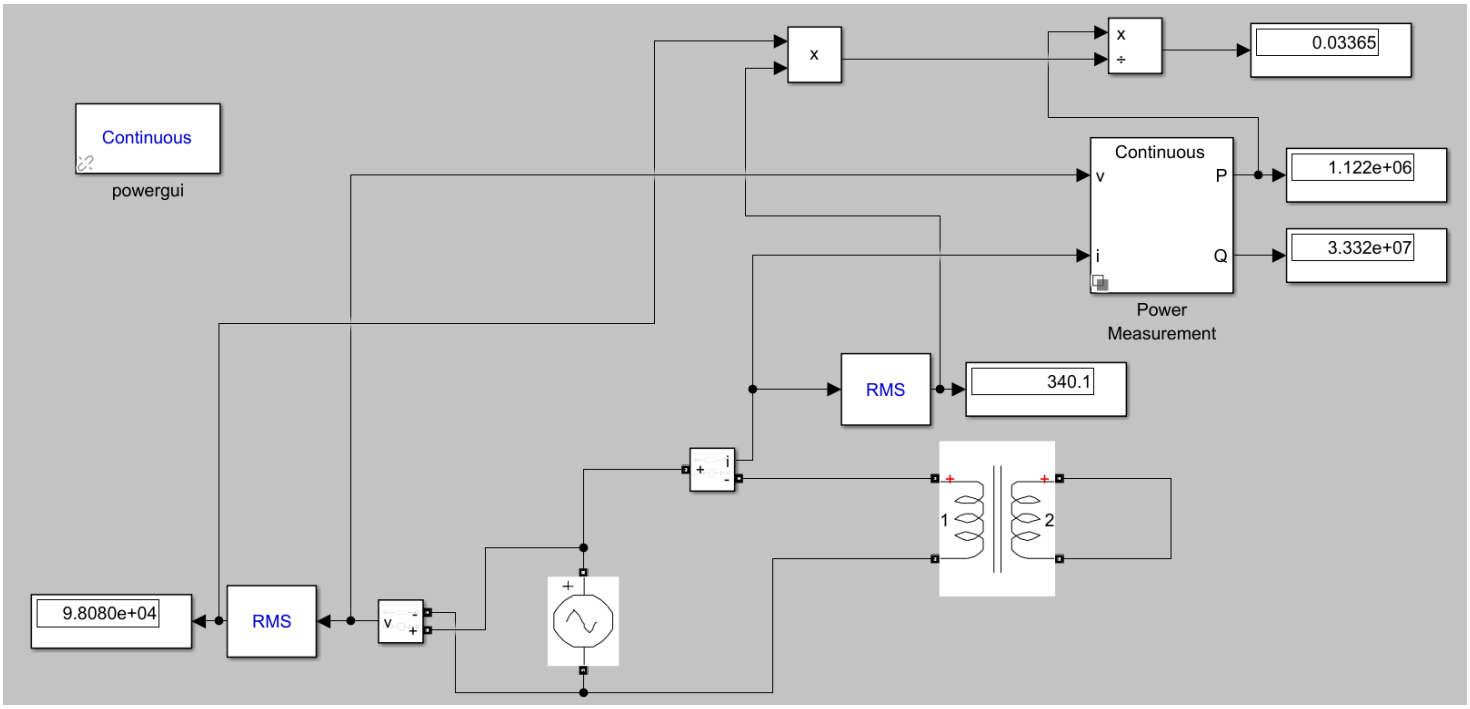
i) Magnetization Resistance (Rm) = 1.0804 x 106 Ohms (Theoretical)
Rc = 1.07 x 106 Ohms (Practical)
ii) Inductance (Lm) = 2866 H (Theoretical)
Lm = 2882.87 H (Practical)

Parameters for Short Circuit Test :

Input voltage = (7.35e+05)*sqrt(2)*0.13365 V
Frequency = 50Hz

(Transformer Parameters are the same as in the previous test.)

Short Circuit Test :



Power Factor = cos θ = $P_{SC}/(V_{SC} \times I_{SC})$
= 0.03365

θ = 88.0716°

Impedance Z_E = $(V_{SC} / I_{SC}) \angle\theta$ ohm
= 288.3857 ohm
= (9.7) + j (288.22) ohm
= R_{Eq} + j X_{Eq} ohm

R_{Eq}= 9.7 ohm
X_{Eq} = 288.22 ohm

Verification:

Req = Rp + a2 *Rs
Req = 4.3218 + (2.3333)2 * 0.7938
Req = 8.6435 Ohms (Theoretical)
Req = 7.86044 Ohms (Practical)

Xeq = Xp + a2 *Xs
Xeq = $(0.45856 + (2.3333)^2 \times 0.084225) \times 2\pi f$
Xeq = 287.97104 Ohms (Theoretical)
Xeq = 288.22617 Ohms (Practical)

Conclusions:

1. The practical as well as theoretical values of R_C and X_M are approximately equal. Hence, the values found practically are correct.
2. The practical as well as theoretical values of Req and Xeq are approximately equal. Hence, the values found practically are correct