

## REFERENCE LIST

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## APPENDICE A: MATLAB CODES

Table A.1: MATLAB code for simulation of input current on open circuit

```
clc;
Is(1) =0;
Y (1) = 0;
Delt = 0.0000001;
R = 0.083;
L=0.000458;
Rc=1322.5;
t=0;

for k= 1:1:200000
Vs(k) = 340*cos(314.15*t);

I1(k)= (-0.4746* Y(k)^6)+(2.0944* Y(k)^5)+(0.7191* Y(k)^4)-
        (0.6226* Y(k)^3)-(0.2973* Y(k)^2)+(0.0999* Y(k))- 0.014;

Is(k+1) = Is(k)*(1-(Delt*(R+Rc)/L)) + (Delt*Vs(k)/L)
        +(Delt*Rc*I1(k)/L);

Y (k+1) = Y (k) + Delt*Rc*(Is(k)-I1(k));

t = t + Delt;
end

plot(Is);
grid on;
xlswrite('Test.xlsx',Is');
```

Table A.2: MATLAB code for simulation of input current with load on secondary

```

clc;
Is(1) = 0;
I2(1) = 0;
Y(1) = 0;
Delt = 0.0000001;
R1 = 0.083;
R2 = 0.083;
L1=0.000458;
L2=0.000458;
RL= 45;
Rc=1322.5;
t=0;

for k= 1:1:400000
Vs(k) = 340*cos(314.15*t);

I1(k) = (-0.4746* Y(k)^6)+(2.0944* Y(k)^5)+(0.7191* Y(k)^4)-
(0.6226* Y(k)^3)-(0.2973* Y(k)^2)+(0.0999* Y(k))-0.014 +
(40/23)*I2(k);

Is(k+1) = Is(k)*(1-(Delt*(R1+Rc)/L1)) + (Delt*Vs(k)/L1)
+(Delt*Rc*I1(k)/L1);

I2(k+1) = I2(k)*(1-(Delt*(R2+RL)/L2)) + (Delt*(40/23)*Rc*(Is(k)-
I1(k))/L2);

Y(k+1) = Y(k) + Delt*Rc*(Is(k)-I1(k));

t = t + Delt;
end

plot(Is);
grid on;
xlswrite('Test22_Is.xlsx',Is');
xlswrite('Test22_I2.xlsx',I2');
xlswrite('Test22_Flux.xlsx', Y ');

```

Table A.3: MATLAB code for simulation of input current with heavy DC current injected to the secondary

```

clc;
Is(1) = 0;
I2(1) = 0;
Y(1) = -1.29;
Delt = 0.0000001;
R1 = 0.083;
R2 = 0.083;
L1=0.000458;
L2=0.000458;
RL= 45;
Rc=1322.5;
t=0;
for k= 1:1:800000
    Vs(k) = 340*cos(314.15*t);

    I1(k) = (-0.4746* Y(k)^6)+(2.0944* Y(k)^5)+(0.7191* Y(k)^4)-
            (0.6226* Y(k)^3)-(0.2973* Y(k)^2)+(0.0999* Y(k))-0.014 +
            (40/23)*I2(k);

    Is(k+1) = Is(k)*(1-(Delt*(R1+Rc)/L1)) + (Delt*Vs(k)/L1)
            +(Delt*Rc*I1(k)/L1);

    I2(k+1) = I2(k)*(1-(Delt*(R2+RL)/L2)) + (Delt*(40/23)*Rc*(Is(k)-
            I1(k))/L2);

    If (I2(k+1)<= 0)
        I2(k+1) = 0;
    end

    Y(k+1) = Y(k) + Delt*Rc*(Is(k)-I1(k));

    t = t + Delt;
end

plot(Is);
grid on;
xlswrite('Test7.xlsx',Is');
xlswrite('Test8.xlsx',I2');
xlswrite('Test9.xlsx', Y ');

```

Table A.4: MATLAB code for simulation of input current with small DC current injected to the secondary

```

clc;
Is(1) = 0;
I2(1) = 0;
Y(1) = 1.04;
I3(1) = 0;
Delt = 0.0000001;
R1 = 0.083;
R2 = 0.083;
L1=0.000458;
L2=0.000458;
RL1= 58;
RL2= 170;
Rc=1322.5;
t=0;

for k= 1:1:800000
Vs(k) = 340*cos(314.15*t);

I1(k) = (-0.4746* Y(k)^6)+(2.0944* Y(k)^5)+(0.7191* Y(k)^4) -
(0.6226* Y(k)^3)- (0.2973* Y(k)^2)+(0.0999* Y(k))-0.014 +
(40/23)*I2(k);

Is(k+1) = Is(k)*(1-(Delt*(R1+Rc)/L1)) + (Delt*Vs(k)/L1)
+(Delt*Rc*I1(k)/L1);

I2(k+1) = I2(k)*(1-(Delt*(R2+RL1)/L2)) + (Delt*(40/23)*Rc*(Is(k)-
I1(k))/L2)+ (Delt*RL1*I3(k)/L2);

I3(k+1) = I2(k+1)*RL1/(RL2+RL1);

If (I3(k+1)>= 0)
I3(k+1) = 0;
end
Y(k+1) = Y(k) + Delt*Rc*(Is(k)-I1(k));
t = t + Delt;
end
plot(Is);
grid on;
xlswrite('Test20_Is.xlsx',Is');
xlswrite('Test20_I2.xlsx',I2');
xlswrite('Test20_I3.xlsx',I3');
xlswrite('Test20_Flux.xlsx', Y');
xlswrite('Test14.xlsx',Vs');

```