boletin_iyme_gie_tema_2_p1

September 25, 2017

```
In [25]: from numpy import *
```

Un transformador monofásico 220/380 V de 10 kVA, 50 Hz se somete a los ensayos de vacío y cortocircuito, obteniendosé los siguientes resultados:

Ensayo	Devanado	Tensión (V)	Intensidad (A)	Potencia (W)
Vacío	Primario	220	2	150
Corto	Secundario	10	26,32	75

Determinar:

1. Los prámetros del circuito equivalente
2. Si el primario se alimenta a 220 V, calcular la tensión secundaria cuando el transformador funciona a plena carga con f.p. 0.8 inductivo

0.0.1 1. Parámetros del circuito equivalente aproximado referido al primario (fase-fase)

```
In [26]: P_1_0 = 150.0
         I_1_0 = 2.0
         U_1_0 = 220

         S_1_0 = I_1_0*U_1_0
         phi_0 = arccos(P_1_0/S_1_0)

         I_fe = I_1_0 * cos(phi_0)
         I_mu = I_1_0 * sin(phi_0)


         R_fe = U_1_0/I_fe
         print('R_fe = {:2.3f}'.format(R_fe))

         I_mu = U_1_0/I_fe
         print('X_mu = {:2.3f}'.format(X_mu))
```

```
R_fe = 322.667
X_mu = 117.009
```

```
In [27]: P_2_cc = 75.0
         I_2_cc = 26.32
         U_2_cc = 10.0

         S_2_cc = I_2_cc*U_2_cc
         phi_cc = arccos(P_2_cc/S_2_cc)

         Z_cc = U_2_cc/I_2_cc

         r_t = 380/220
         R_2_cc = Z_cc*cos(phi_cc)
         R_cc = R_2_cc / r_t**2
         print('R_cc = {:2.3f}'.format(R_cc))

         X_2_cc = Z_cc*sin(phi_cc)
         X_cc = X_2_cc / r_t**2
         print('X_cc = {:2.3f}'.format(X_cc))
```

```
R_cc = 0.036
X_cc = 0.122
```

0.0.2 2. Caída de tensión unitaria a plena carga y factor de potencia 0.8 inductivo

```
In [24]: e_cc = U_2_cc/380.0
         #phi_cc = arctan(X_cc/R_cc)
         e_cc_r = e_cc*cos(phi_cc)
         e_cc_x = e_cc*sin(phi_cc)

         C = 1.0
         phi_c = arccos(0.8)
         e_c = C*(e_cc_r*cos(phi_c) + e_cc_x*sin(phi_c))
         U = 380*(1-e_c)
         print('U = {:2.3f}'.format(U))
```

```
U = 371.969
```

```
In [68]: C = 1.0
         phi_c = arccos(0.8)
         Ip2 = C*I_1_n*exp(1j*phi_c)
         Z_cc = R_cc + 1j*X_cc
         Up2_fase = U_1_n/sqrt(3)
         U_1_fase = Up2_fase + Ip2*Z_cc
```

```
In [69]: e_c = (abs(U_1_fase)-abs(Up2_fase))/abs(Up2_fase)
         e_c
```

```
Out[69]: -0.034512924454251311
```

```
In [39]: Ip2

Out[39]: (11.547005383792516+8.6602540378443837j)

In [31]: Z_cc

Out[31]: (6.66666986833307+34.00161727704122j)

In [32]: U_1_n

Out[32]: 10000.0

In [49]: Ip2

Out[49]: (11.547005383792516+8.6602540378443837j)

In [ ]:
```