This Mathcad CT simulation is based on the paper "Computer Simulation of Current Transformers and Relays For Performance Analysis" by R. Garrett, W.C. Kotheimer, and S.E. Zocholl, presented before the 14th Annual Western Protective Relay Conference, October 20-23, 1987.

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May 7, 2003  
Modified by B.K. Johnson

\[
\begin{align*}
\text{CY} & := 6 & \text{Length of simulation in cycles} \\
I_{\text{mag}} & := 21600 & \text{RMS magnitude of CT primary current} \\
X & := 24 & \text{Power system inductive reactance component of X/R} \\
R & := 2 & \text{Power system resistance component of X/R} \\
R_B & := 5 & \text{Resistive burden. Reactive burden set to 20\% R_B} \\
X_B & := 0 & \text{Reactive Burden in Ohms} \\
I_{\text{rated}} & := 5 & \text{CT rated secondary current} \\
N & := 240 & \text{CT turns ratio} \\
V_{\text{RAT}} & := 800 & \text{CT "C-Rating"} \\
\text{Rem} & := 0 & \text{Per Unit Remnant Flux} \\
\end{align*}
\]

\[
\left( 1 + \frac{X}{R} \right)^{-1} \cdot \frac{I_{\text{mag}}}{I_{\text{rated}}} \cdot \frac{|R_B + j \cdot \omega \cdot L_b|}{V_{\text{RAT}}} \cdot 100 = 146.3 \quad \text{If this is less than 20, the CT satisfies criterion to avoid saturation entirely}
\]
Magnitizing Current on B-H Curve
Magnitizing Branch Inductance

$L_m$
Magnetizing Flux Density

$B(NI_M)$

Reaches 1.8 T in 6.7ms