The Mathcad file that processes the primary and secondary data is listed below.

Import data from an external file into matrix "Data."

$Data :=$

C:\..\BUR24018.CSV

Count rows of matrix "Data" and create an index "i" as a row pointer.

$i := 0 .. rows(Data) - 1$

Create time vector "t" and calculate the data time-step, Δt.

$t := Data^{<0>}$

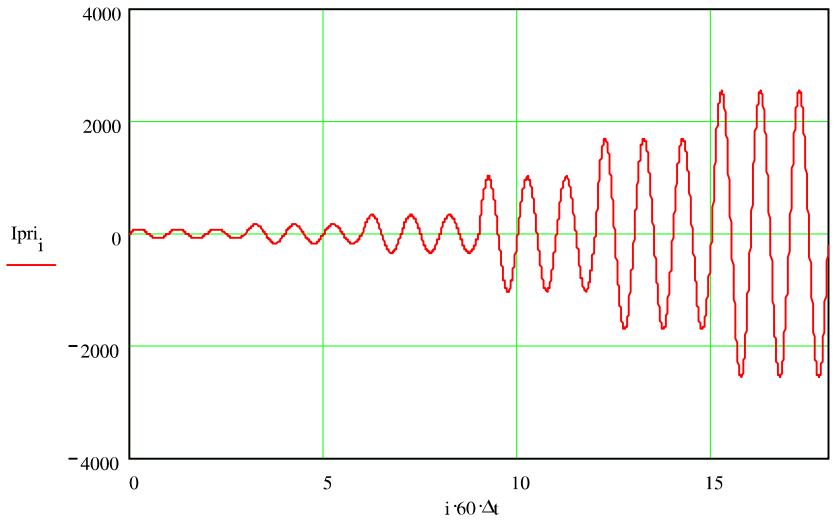
$\Delta t := t_1 - t_0$

Create current vector "Isec" and "Ipri" from imported data.

$Isec := Data^{<1>}$

$Ipri := Data^{<2>}$

Plot Ipri. The data from ATP consists of 3 cycles each at 5%, 10%, 20%, 60%, 100%, and 150% rated primary current. The functions below calculate RCF and PACF using the "middle" cycle of the 3-cycle tests.



Create an index of middle cycle endpoints.

$y := 2, 5 .. 17$

Create functions k(y) and g(y) to calculate the beginning and ending row index points of the middle cycle.

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$$k(y) := \text{ceil}\left[\frac{(y-1)}{60\cdot\Delta t}\right]$$

$$g(y) := \text{ceil}\left(\frac{y}{60\cdot\Delta t}\right)$$

Create function RMS to calculate the rms value of the middle cycle of current "I" determined by "Y."

$$\begin{aligned} RMS(I,Y) := \;& rms \leftarrow 0 \\ & \text{for } j \in k(Y)\,..\,g(Y) \\ & \quad rms \leftarrow \left[60\cdot\left(I_j\right)^2\cdot\Delta t\right] + rms \\ & RMS \leftarrow \sqrt{rms} \end{aligned}$$

Calculate the number of data points per quarter cycle.

$$r := \text{ceil}\left(\frac{1}{4}\cdot\frac{1}{60}\cdot\frac{1}{\Delta t}\right)$$

Create function PA to calculate the phase angle difference in seconds between Ipri and Isec at middle cycle points.

$$\begin{aligned} PA(Y) := \;& pa \leftarrow 0 \\ & \text{for } j \in k(Y), k(Y)+2\,..\,g(Y) \\ & \quad Ipcc_j \leftarrow Ipri_{j+r} + j\cdot Ipri_j \\ & \quad Iscc_j \leftarrow Isec_{j+r} + j\cdot Isec_j \\ & \quad pa_j \leftarrow \arg\left(Ipcc_j\right) - \arg\left(Iscc_j\right) \\ & PA \leftarrow -\text{mean}(pa)\cdot\frac{180\cdot 60}{\pi} \end{aligned}$$

I am stuckup here. The for loop is going on and on. How to implement this part- any help shall be appreciated.

```
for j=k(n):g(n)

    Ipcc(j)= Ipri(j+r)+i*Ipri(j)

    Iscc(j)= Isec(j+r)+i*Isec(j)
    pa(j)= arg(Ipcc(j))-arg(Isec(j))

endfor
```

Calculate the rms value of secondary current, Isec at t

$$RMSsec_y := RMS(Isec, y)$$

Calculate the rms value of primary current, Ipri at the middle cycle points, y.

$$RMSpri_y := RMS(Ipri, y)$$

Calculate the phase angle difference in seconds between Ipri and Isec at the middle cycle points, y.

$$PA_y := PA(y)$$

Calculate the ratio correction factor, RCF at each middle cycle point, y. The calculation assumes a 1200/5 CT.

$$RCF_y := \frac{RMSpri_y}{RMSsec_y\cdot 240}$$

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