Important Nominal Pi-Method in Medium Line Formulas PDF

Formulas
Examples
with Units

List of 20
Important Nominal Pi-Method in Medium Line Formulas

1) A-Parameter in Nominal Pi Method Formula

Evaluate Formula

Formula

$$A_{pi} = 1 + \left(Y_{pi} \cdot \frac{Z_{pi}}{2} \right)$$

Example with Units

$$1.0956 = 1 + \left(0.021\,\text{S} \cdot \frac{9.1\,\Omega}{2} \right)$$

2) B Parameter for Reciprocal Network in Nominal Pi Method Formula

Evaluate Formula

Formula

$$B_{pi} = \frac{\left(A_{pi} \cdot D_{pi} \right) - 1}{C_{pi}}$$

Example with Units

$$8.7977\,\Omega = \frac{\left(1.095 \cdot 1.09 \right) - 1}{0.022\,\text{S}}$$

3) C Parameter in Nominal Pi Method Formula

Evaluate Formula

Formula

$$C_{pi} = Y_{pi} \cdot \left(1 + \left(Y_{pi} \cdot \frac{Z_{pi}}{4} \right) \right)$$

Example with Units

$$0.022\,\text{S} = 0.021\,\text{S} \cdot \left(1 + \left(0.021\,\text{S} \cdot \frac{9.1\,\Omega}{4} \right) \right)$$

4) D Parameter in Nominal Pi Method Formula

Evaluate Formula

Formula

$$D_{pi} = 1 + \left(Z_{pi} \cdot \frac{Y_{pi}}{2} \right)$$

Example with Units

$$1.0956 = 1 + \left(9.1\,\Omega \cdot \frac{0.021\,\text{S}}{2} \right)$$

5) Impedance using A Parameter in Nominal Pi Method Formula

Evaluate Formula

Formula

$$Z_{pi} = 2 \cdot \frac{A_{pi} - 1}{Y_{pi}}$$

Example with Units

$$9.0476\,\Omega = 2 \cdot \frac{1.095 - 1}{0.021\,\text{S}}$$

6) Load Current using Losses in Nominal Pi Method Formula

Evaluate Formula

Formula

$$I_{L(pi)} = \sqrt{\frac{P_{loss(pi)}}{R_{pi}}}$$

Example with Units

$$3.3615\,\text{A} = \sqrt{\frac{85.2\,\text{W}}{7.54\,\Omega}}$$

7) Load Current using Transmission Efficiency in Nominal Pi Method Formula

Evaluate Formula

Formula

$$I_{L(pi)} = \sqrt{\frac{\left(\frac{P_{r(pi)}}{\eta_{pi}}\right) - P_{r(pi)}}{R_{pi}} \cdot 3}$$

Example with Units

$$5.8361\,\text{A} = \sqrt{\frac{\left(\frac{250.1\,\text{W}}{0.745}\right) - 250.1\,\text{W}}{7.54\,\Omega} \cdot 3}$$

8) Losses in Nominal Pi Method Formula

Evaluate Formula

Formula

$$P_{loss(pi)} = \left(I_{L(pi)}^{2}\right) \cdot R_{pi}$$

Example with Units

$$85.1236\,\text{W} = \left(3.36\,\text{A}^{2}\right) \cdot 7.54\,\Omega$$

9) Losses using Transmission Efficiency in Nominal Pi Method Formula

Evaluate Formula

Formula

$$P_{loss(pi)} = \left(\frac{P_{r(pi)}}{\eta_{pi}}\right) - P_{r(pi)}$$

Example with Units

$$85.6047\,\text{W} = \left(\frac{250.1\,\text{W}}{0.745}\right) - 250.1\,\text{W}$$

10) Receiving End Angle using Transmission Efficiency in Nominal Pi Method Formula

Evaluate Formula

Formula

$$\Phi_{r(pi)} = acos\left(\frac{\eta_{pi} \cdot P_{s(pi)}}{3 \cdot I_{r(pi)} \cdot V_{r(pi)}}\right)$$

Example with Units

$$87.9981° = acos\left(\frac{0.745 \cdot 335\,\text{W}}{3 \cdot 7.44\,\text{A} \cdot 320.1\,\text{V}}\right)$$

11) Receiving End Current using Transmission Efficiency in Nominal Pi Method Formula

Evaluate Formula

Formula

$$I_{r(pi)} = \frac{\eta_{pi} \cdot P_{s(pi)}}{3 \cdot V_{r(pi)} \cdot \left(\cos\left(\Phi_{r(pi)}\right)\right)}$$

Example with Units

$$7.4099\,\text{A} = \frac{0.745 \cdot 335\,\text{W}}{3 \cdot 320.1\,\text{V} \cdot \left(\cos\left(87.99°\right)\right)}$$

12) Receiving End Voltage using Sending End Power in Nominal Pi Method Formula

Evaluate Formula

Formula

$$V_{r(pi)} = \frac{P_{s(pi)} - P_{loss(pi)}}{I_{r(pi)} \cdot \cos\left(\Phi_{r(pi)}\right)}$$

Example with Units

$$957.2716\,\text{V} = \frac{335\,\text{W} - 85.2\,\text{W}}{7.44\,\text{A} \cdot \cos\left(87.99°\right)}$$

13) Receiving End Voltage using Voltage Regulation in Nominal Pi Method Formula

Evaluate Formula

Formula

$$V_{r(pi)} = \frac{V_{s(pi)}}{\%V_{pi} + 1}$$

Example with Units

$$321.9512\,\text{V} = \frac{396\,\text{V}}{0.23 + 1}$$

14) Resistance using Losses in Nominal Pi Method Formula

Evaluate Formula

Formula

$$R_{pi} = \frac{P_{loss(pi)}}{I_{L(pi)}^2}$$

Example with Units

$$7.5468\,\Omega = \frac{85.2\,\text{W}}{3.36\,\text{A}^2}$$

15) Sending End Current using Transmission Efficiency in Nominal Pi Method Formula

Evaluate Formula

Formula

$$I_{s(pi)} = \frac{P_{r(pi)}}{3 \cdot \cos\left(\Phi_{s(pi)}\right) \cdot \eta_{pi} \cdot V_{s(pi)}}$$

Example with Units

$$0.3048\,\text{A} = \frac{250.1\,\text{W}}{3 \cdot \cos\left(22°\right) \cdot 0.745 \cdot 396\,\text{V}}$$

16) Sending End Power using Transmission Efficiency in Nominal Pi Method Formula

Evaluate Formula

Formula

$$P_{s(pi)} = \frac{P_{r(pi)}}{\eta_{pi}}$$

Example with Units

$$335.7047\,\text{W} = \frac{250.1\,\text{W}}{0.745}$$

17) Sending End Voltage using Transmission Efficiency in Nominal Pi Method Formula

Evaluate Formula

Formula

$$V_{s(pi)} = \frac{P_{r(pi)}}{3 \cdot \cos\left(\Phi_{s(pi)}\right) \cdot I_{s(pi)}} / \eta_{pi}$$

Example with Units

$$402.2991\,\text{V} = \frac{250.1\,\text{W}}{3 \cdot \cos\left(22°\right) \cdot 0.3\,\text{A}} / 0.745$$

18) Sending End Voltage using Voltage Regulation in Nominal Pi Method Formula

Evaluate Formula

Formula

$$V_{s(pi)} = V_{r(pi)} \cdot \left(\%V_{pi} + 1\right)$$

Example with Units

$$393.723\,\text{V} = 320.1\,\text{V} \cdot \left(0.23 + 1\right)$$

19) Transmission Efficiency (Nominal Pi Method) Formula

Evaluate Formula

Formula

$$\eta_{pi} = \frac{P_{r(pi)}}{P_{s(pi)}}$$

Example with Units

$$0.7466 = \frac{250.1\,\text{W}}{335\,\text{W}}$$

20) Voltage Regulation (Nominal Pi Method) Formula

Evaluate Formula

Formula

$$\%V_{pi} = \frac{V_{s(pi)} - V_{r(pi)}}{V_{r(pi)}}$$

Example with Units

$$0.2371 = \frac{396\,\text{V} - 320.1\,\text{V}}{320.1\,\text{V}}$$

Variables used in list of Nominal Pi-Method in Medium Line Formulas above

- $\%V_{pi}$ Voltage Regulation in PI
- A_{pi} A Parameter in PI
- B_{pi} B Parameter in PI *(Ohm)*
- C_{pi} C Parameter in PI *(Siemens)*
- D_{pi} D Parameter in PI
- $I_{L(pi)}$ Load Current in PI *(Ampere)*
- $I_{r(pi)}$ Receiving End Current in PI *(Ampere)*
- $I_{s(pi)}$ Sending End Current in PI *(Ampere)*
- $P_{loss(pi)}$ Power Loss in PI *(Watt)*
- $P_{r(pi)}$ Receiving End Power in PI *(Watt)*
- $P_{s(pi)}$ Sending End Power in PI *(Watt)*
- R_{pi} Resistance in PI *(Ohm)*
- $V_{r(pi)}$ Receiving End Voltage in PI *(Volt)*
- $V_{s(pi)}$ Sending End Voltage in PI *(Volt)*
- Y_{pi} Admittance in PI *(Siemens)*
- Z_{pi} Impedance in PI *(Ohm)*
- η_{pi} Transmission Efficiency in PI
- $\Phi_{r(pi)}$ Receiving End Phase Angle in PI *(Degree)*
- $\Phi_{s(pi)}$ Sending End Phase Angle in PI *(Degree)*

Constants, Functions, Measurements used in list of Nominal Pi-Method in Medium Line Formulas above

- Functions: **acos**, acos(Number)
  The inverse cosine function, is the inverse function of the cosine function. It is the function that takes a ratio as an input and returns the angle whose cosine is equal to that ratio.
- Functions: **cos**, cos(Angle)
  Cosine of an angle is the ratio of the side adjacent to the angle to the hypotenuse of the triangle.
- Functions: **sqrt**, sqrt(Number)
  A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- Measurement: **Electric Current** in Ampere (A)
  Electric Current Unit Conversion
- Measurement: **Power** in Watt (W)
  Power Unit Conversion
- Measurement: **Angle** in Degree (°)
  Angle Unit Conversion
- Measurement: **Electric Resistance** in Ohm (Ω)
  Electric Resistance Unit Conversion
- Measurement: **Electric Conductance** in Siemens (S)
  Electric Conductance Unit Conversion
- Measurement: **Electric Potential** in Volt (V)
  Electric Potential Unit Conversion

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