Lab Session 4
(19-23 Feb. 2024)

Objectives:

On Simulink, perform the following activities:

[A] A single-phase power system consists of a 480-V 50-Hz generator supplying a load $\square_{\square\square\square\square} = 4 + \square 3\ \square$ through a transmission line of impedance $\square_{\square\square\square\square} = 0.18 + \square 0.24\ \square$. Observe and report the following about this system.

(1) Magnitude of line current and its phase angle.

(2) Magnitude of load voltage and phase angle.

(3) Phase difference between line current and the source voltage.

(4) Phase difference between the load current and the load voltage.

(5) Power loss in the transmission line.

(6) Voltage drop across the line impedance.

[B] Suppose a 1:10 step-up transformer is placed at the generator end of the transmission line and a 10: 1 step-down transformer is placed at the load end of the line.

(1) Magnitude of source, line and load current and respective phase angle.

(2) Magnitude of load voltage and phase angle.

(3) Phase difference between source current and the source voltage.

(4) Phase difference between line current and the source voltage.

(5) Phase difference between the load current and the load voltage.

(6) Power loss in the transmission line.

(7) Voltage drop across the line impedance.

[C] Report the observed difference of the power losses in the transmission line in the above two set-ups of the power system. Understand the importance of use of transformers in the power system.