EE2029 – Introduction to Electrical Energy Systems
Tutorial: Line Conductors

1. A 60-Hz single-phase, two-wire overhead line has solid cylindrical copper conductors with 1.2 cm diameter. The conductors are arranged in a horizontal configuration with 0.5 m spacing. Find the inductance of each conductor due to internal flux linkages only, and the inductance of each conductor due to both internal and external flux linkages.

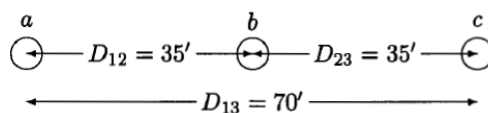(Answer: L_{int}=0.5x10^{-7} H/m, L=9.346x10^{-7} H/m)

2. Find the GMR of three symmetrically spaced conductors configured as an equilateral triangle. The spacing between conductors is 50 cm. Assume that r = 2 cm, r' = 2e$^{-0.25}$ = 1.56 cm.

(Answer: 15.7 cm)

3. A 60 Hz three-phase, three-wire overhead line has solid cylindrical conductors arranged in the form of an equilateral triangle with 1.2 m conductor spacing. Conductor diameter is 1 cm. Calculate the line inductance in H/m, and the inductive reactance in Ω/km.

(Answer: 1.146x10^{-6} H/m, 0.432 Ω/km)

4. A 500 kV three-phase line is composed of one ACSR conductor per-phase with horizontal conductor configuration as shown below. The conductors have a diameter of 1.345 inches and a GMR of 0.5328 inch. Find the line inductance per km.

(Answer: 1.38 mH/km)