

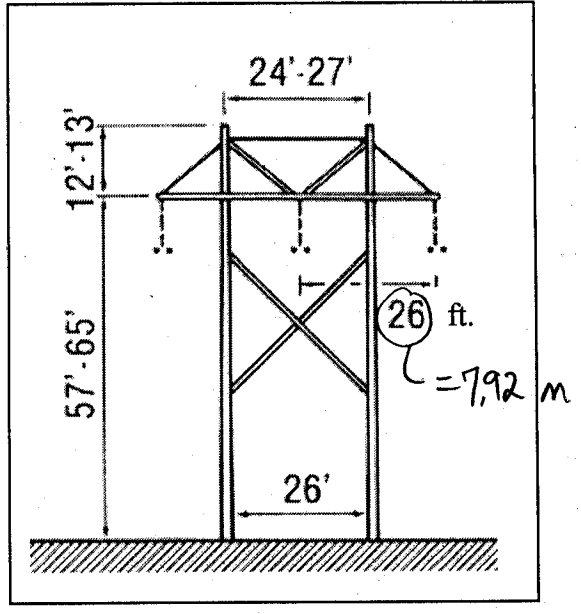
Pos/Neg Seq.

Each phase of the 345kV transmission configuration shown has two bundled 795ACSR conductors, separated by 45.7cm. The characteristics of a 795ACSR conductor are

$r = 1.407\text{cm}$, $r_{gmr} = 1.137\text{cm}$,
 $R_{60\text{Hz}} = 0.0728\Omega/\text{km}$.

The conversion from feet to meters is 3.281 feet per meter.

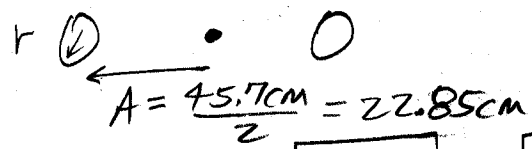
- a. Find the positive/negative sequence C, L, and R per meter of length
- b. Draw the corresponding pi-equivalent circuit, in ohms @ 60Hz, for a 100km long line.



$R_{60\text{Hz}} = \frac{0.0728 \Omega/\text{km}}{2} = 0.0364 \Omega/\text{km} \rightarrow 100\text{KM has } 3.64 \Omega$
 $= 36.4 \mu\Omega/\text{m}$

$C_{+-} = \frac{2\pi\epsilon_0}{\ln \frac{GMD_{+-}}{GMR_{c+-}}} \text{ F/m}$. $GMD_{+-} = \sqrt[6]{(7.92)(15.84)(7.92)(7.92)(7.92)(15.84)}$
 $GMD_{+-} = 9.98\text{m}$

For the bundle



$GMR_{c+-} = \sqrt{2rA} = \sqrt{2(1.407)(22.85)} = 8.02\text{cm}$

$C_{+-} = \frac{2\pi(8.854)}{\ln \frac{9.98}{0.0802}} \text{ pF/m} = 11.53 \text{ pF/m}$

$GMR_{L+-} = \sqrt{2r_{gmr}A} = \sqrt{2(1.137)(22.85)} = 7.21\text{cm}$

$L_{+-} = \frac{\mu_0}{2\pi} \ln \frac{GMD_{+-}}{GMR_{L+-}} = (2 \times 10^{-7}) \ln \frac{9.98}{0.0721} = 0.986 \mu\text{H/m}$

