Problem 1. A 60-Hz three-phase, three-wire overhead line has solid cylindrical conductors arranged in the form of an equilateral triangle with 4 ft conductor spacing. Conductor diameter is 0.5 in. Calculate the positive-sequence inductance in H/m and the positive-sequence inductive reactance in Ω/km.

Problem 2. Calculate the capacitance-to-neutral in F/m and the admittance-to-neutral in S/km for the three-phase line in Problem 1 (stated above). Neglect the effect of the earth plane.

Problem 3. Rework Problem 2 if the phase spacing is:

(a) Increased by 20% to 4.8 ft.
(b) Decreased by 20% to 3.2 ft.

Compare the results with those of Problem 2.

Problem 4. A 500-km, 500-kV, 60-Hz uncompensated three-phase line has a positive-sequence series impedance $z=0.03+j0.35 \, \Omega/km$ and a positive-sequence shunt admittance $y=j4.4 \times 10^{-6} \, S/km$. Calculate:

(a) $Z_c$
(b) $(\gamma l)$
(c) The exact ABCD parameters for this line.

Problem 5. A 320-km 500-kV, 60-Hz three-phase uncompensated line has a positive-sequence series reactance $x=0.34 \, \Omega/km$ and a positive-sequence shunt admittance $y=j4.5 \times 10^{-6} \, S/km$. Neglecting losses, calculate:

(a) $Z_c$
(b) $(\gamma l)$
(c) The exact ABCD parameters for this line.
(d) The wavelength $\lambda$ of the line, in kilometers.
(e) The surge impedance loading in MW.