Çankaya University
Electrical & Electronics Engineering Department
EE 322 Energy Distribution Homework # 2 Due: 18.4.2018

1-

A single-phase overhead transmission line consists of two solid aluminum conductors having a radius of 3 cm with a spacing 3.5 m between centers. (a) Determine the total line inductance in mH/m. (b) Given the operating frequency to be 60 Hz, find the total inductive reactance of the line in Ω/km and in Ω/mi. (c) If the spacing is doubled to 7 m, how does the reactance change?

2-

Calculate the inductive reactance in Ω/km of a bundled 500-kV, 60-Hz, three-phase completely transposed overhead line having three ACSR $r=1.33\,\text{cm}$ conductors per bundle, with 0.5 m between conductors in the bundle. The horizontal phase spacings between bundle centers are 10, 10, and 20 m.

3-

Calculate the capacitance-to-neutral in F/m and the admittance-to-neutral in S/km for the line in Problem 2 . Also calculate the total reactive power in Mvar/km supplied by the line capacitance when it is operated at 500 kV. Neglect the effect of the earth plane. Use $r=1.642\,\text{cm}$