

EE531 Homework 3

Two identical 345 kV lines have the following characteristics

2-conductor Grackle bundle, 18 “ spacing

Phase horizontal coordinates 0, 27, 54’

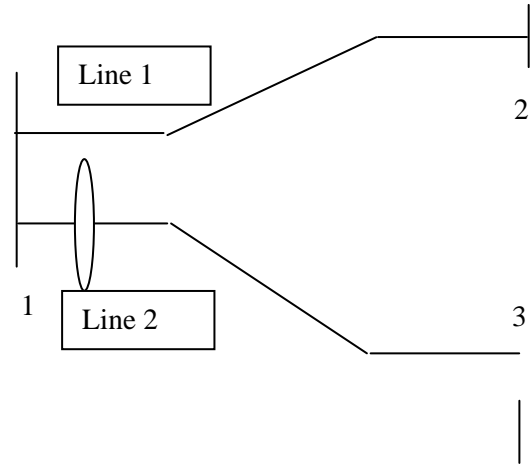
Phase vertical coordinates 70, 76, 70 ‘

Phase sag 22’

Shield Wires, 2 , 3/8” steel

Shield horizontal coordinates 13’, 41’

Shield vertical coordinates 85’, 85’



The lines leave a substation along a common right of way on centers that are 105’ apart. After 20 miles they separate. Each line is 200 miles long.

- A. Develop the capacitive admittance (mho/mi) for
 - a. Each Single (uncoupled) line
 - b. The coupled segment
- B. Develop the (total) capacitive admittance matrix for the lines. (As an approximation you can take these to be 20 miles of coupled line matrix + 180 miles of uncoupled.)
- C. Develop the sequence capacitive admittance matrix for the total line
- D. Give me the primitive capacitive admittance matrices for the coupled lines for positive and zero sequence.

E. Formulate the following problem and solve

The sending end of the lines is bus 1 and the voltages are balanced positive sequence, 345 kV

The second line is open at both ends. Ignore line series impedance and

- a. Find the charging current in Line 1
- b. Find voltage induced in line 2

You will need to come up with the model and formula.