

EE 483/583 Antennas for Wireless Communications (Spring 2024)

Homework 12 (Optional Extra Credit)

Tuesday, April 23, 2024

- 1) 10.19 Assume spacing is $\lambda_0/40$.
- 2) 10.20 Assume $L = 5$ cm and diameter is 0.54 cm.
- 3) 10.22 Assume axial feed.
- 4) 10.27 Assume $\alpha = 14^\circ$. Notes: (d) Use both formulas from the notes for the directivity. (c) & (e) Do for **both** axial and peripheral feeding.
- 5) **EE 583 only:** Design a 7-turn helical antenna that operates in the normal mode with circular polarization at 915 MHz for an UHF RFID system. The circumference is constrained to be 25 mm. Calculate the a) turn spacing (in wavelengths and in mm), b) axial length/helix height (in wavelengths and in mm), c) length of a single turn (in wavelengths and in mm), d) overall wire length (in wavelengths and in mm), e) pitch angle (in degrees), and f) the broadside phasor vector electric field at a distance of 6 m (assume $I_0 = 12$ A, explicitly enter all known quantities and put in polar form).

Due Tuesday, April 30, 2024 at my office or mail box by 2 pm.

- If completed, this extra credit opportunity will replace your *lowest* HW or quiz grade (as best advantages your overall grade).
- There will be at least one question dealing with this material on the final.
- Assume $c = 2.998 \times 10^8$ m/s for all problems.