

EE 483/583 Antennas for Wireless Communications (Spring 2022)

Homework 12

Monday, April 25, 2022

- 1) 6.3 Hint: Start with forms similar to equations (6-2) & (6-7) for the AF, then use Euler's Identity to simplify.
- 2) For the array in 6.3, find: a) location(s) of the maxima θ_m , b) the power radiated by the array P_{rad} , c) a function for the directivity $D(\theta)$ as well as D_{max} , and d) the half-power points θ_h as well as half-power beamwidth (HPBW) in degrees. These can be found analytically or numerically using MATLAB, MathCad, etcetera. **EE 583 only:** Plot the normalized directivity polar radiation pattern (in dB) in the x - z plane. Use a 0 to -40 dB scale with $\theta = 0$ at the top.
- 3) 6.8
- 4) 6.13 w/ directivity of 12 dBi and element spacing being $\lambda/3$. For part a) choose the closest integer number of elements. In parts c)-d), plot AF over visible region of ψ using Matlab or MathCad and verify/find exact answers .
- 5) 6.17 w/ maximum directed to 0° . In part e), can verify using Matlab or Mathcad.
- 6) 6.27 **EE 483:** verification is optional for parts b) & c). **EE 583 only:** For parts b) & c), verify or find exact answers using Matlab or Mathcad or Arrays.

Notes:

- There will be at least one question dealing with this material on the final.

Due Friday, April 29, 2022 by 1 pm.