

ECEn 560
Electromagnetic Wave Theory

Homework #10

Due February 18, 2016 (may be turned in late for half credit)

1. (a) Design excitations for a seven element Chebyshev array with half wavelength element spacing and sidelobe level 20 dB. (b) What is the null-to-null beamwidth? (c) What is the directivity? (Hint: the array factor is a polynomial, so the total power can be integrated analytically. You can work the integral using Matlab, Maple, Mathematica, etc.) (d) Compare the sidelobe level and beamwidth to that of a ULA with uniform excitations and the same spacing and number of elements. (e) Plot the two radiation patterns using Matlab with the curves on the same figure.
2. [Short answer] (a) What is the Green's function for a layered medium useful for? (b) How does the field radiated by a VED give us part of the Green's function? (c) In deriving the Green's function for a layered medium, why do we expand the fields in terms of cylindrical waves? (d) Why does the field of a VED in a layered medium include only Hankel functions of order zero?