EE 483/583 Antennas for Wireless Communications (Spring 2026)
Homework 5
Wednesday, February 11, 2026

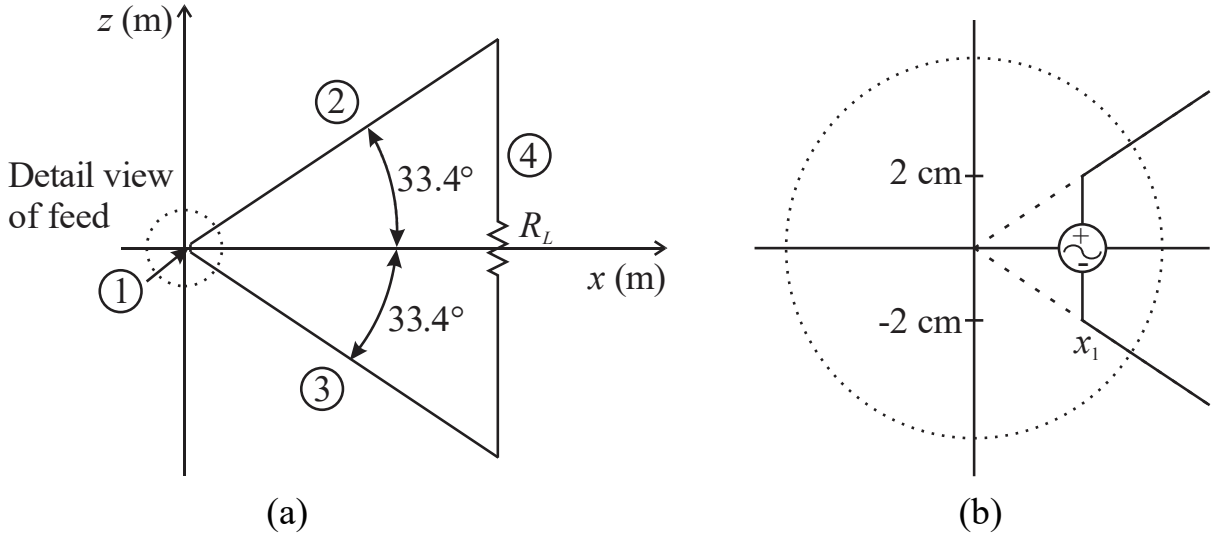

Figure 1 (a) Terminated V antenna and (b) detail view of feed.

For this assignment, you will be writing the NEC-2 commands needed to model and obtain data for/about the terminated V antenna (see section 10.2.2), located on *x*-*z* plane ($y = 0$), shown in Figure 1 from 200-400 MHz. There is a feed centered on section 1 and a resistive load centered on section 4. As shown, lines through sections 2 & 3 converge at origin. To agree with NEC-2, let $c = 2.998\times10^8$ m/s.

1) As shown in Figure 1(b), section 1 is 4 cm long and centered on $y = z = 0$, but is NOT at $x = 0$. Sections 2 and 3 would be 2 m long if they extended all the way to the origin, but instead stop at the top & bottom of section 1. Using geometry, find the points P_{12}, P_{13}, P_{24}, and P_{34} where the sections connect. Also, determine the actual lengths ℓ_2, ℓ_3, & ℓ_4 of sections 2-4. Clearly shown work in an appendix titled '**Geometry Calculations**'. Keep 5-6 significant digits. Use units of meters.

P_{12} = _____ P_{13} = _____

P_{24} = _____ P_{34} = _____

ℓ_2 = _____ ℓ_3 = _____ ℓ_4 = _____

2) All sections are made with **2 AWG wire**. Find the wire radius. Then, select the number of segments and segment sizes for sections 1, 2, 3, and 4. Note: Segments may or may not be equal. Restriction: Do NOT exceed **250 segments** in total. Justify design decisions in an appendix titled '**Segment Selection**'. List total number of segments. Is the extended thin-wire kernel needed? Why?

Antenna section	1	2	3	4
Number segments				
Segment size, Δ				

a_{wire} = _____ Total # segments = _____

EK? _____

3) Type the geometry commands necessary to model the wires for the terminated V antenna for the segment numbers and sizes selected. Assume the antenna is in free space. Assign TAG numbers to wires based on the section numbering shown in Figure 1(a). Keep 5-6 significant digits for dimensions.

4) Type the program control commands necessary to either use the standard or extended thin-wire kernel, model the antenna as being made with aluminum wire with a conductivity of $\mathbf{3.5 \times 10^7\ S/m}$ and place a $\mathbf{240\ \Omega}$ resistive load centered on antenna section 4.

5) Type the program control commands necessary to simulate the antenna from 200 MHz to 400 MHz in 10 MHz steps, generate an impedance table, and to place a voltage source of $10\angle 0°$ V centered on antenna section 1.

6) Type the program control command(s) necessary to output **only** the currents for the segments on antenna section 2.

7) Type the program control commands necessary to output the far-field radiation patterns for **only** the *x-z* plane for $-178° \le \theta \le 180°$ in 2° increments and *x-y* plane for $0 \le \phi \le 358°$ in 2° increments. Output the unnormalized gain with no averaging.

8) Type the program control command(s) to mark the end of the input file.

9) **EE 483 only:** Use work in prior steps as the basis for a NEC-2 input file to simulate this antenna **only** at 300 MHz to determine the input impedance, efficiency (%), maximum gain (dBi), corresponding angle(s) θ & ϕ (deg) where the maximum gain occurs (check both E- and H-planes), and the half-power beamwidths deg) in the elevation and azimuthal planes. Add comment lines at the beginning of the input file (e.g., filename, course, *your name*, date, etcetera) as well as at the end of each line to describe what you are doing. Include a listing of your NEC-2 input file and excerpts from output file with desired quantities in **bold**. Consolidate answers in a single table (put table before output file excerpts).

9) **EE 583 only:** Use work in prior steps as the basis for a NEC-2 input file to simulate this antenna **only** at 300 MHz to determine the input impedance, efficiency (%), maximum gain (dBi), corresponding angle(s) θ & ϕ (deg) where the maximum gain occurs (check both E- and H-planes), and the half-power beamwidths (deg) in the elevation and azimuthal planes. **In addition**, separately plot the E- and H-plane radiation patterns (clearly labeled, in dB, normalized, & with center at -30 dB). Add comment lines at the beginning of the input file (e.g., filename, course, *your name*, date, etcetera) as well as at the end of each line to describe what you are doing. Include a listing of your NEC-2 input file and excerpts from output file with desired quantities in **bold**. Consolidate answers in a single table (put table before output file excerpts).

Due Wednesday, February 18, 2026.