# Path loss/gain along streets

1. Objective:

Understand uniform theory of diffraction (UTD) and path loss/gain; grasp the skills for calculating the diffraction field using UTD; determine the path loss/gain for a simple but realistic propagation environment considering direct rays and diffracted rays.

2. The problem statement:

Calculate the path loss along $\overline{AB}$ and $\overline{CD}$ considering the contributions directly from a point source located at Tx and the diffracted fields from corners Q_1 and Q_2.

a
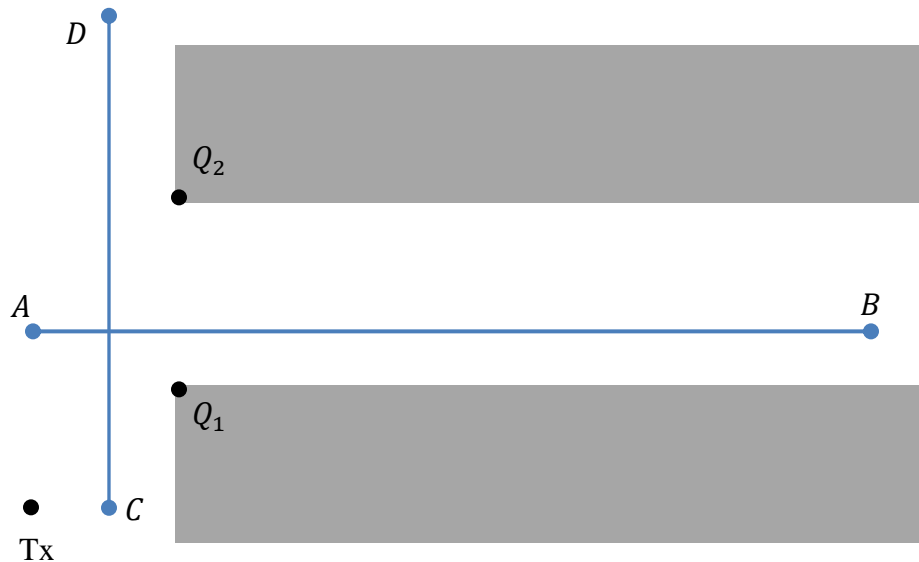
Given the following:
(1) Perpendicular polarization only.
(2) Diffractions only happen at Q_1 and Q_2.
(3) No reflection is considered.
(4) Tx is located at the origin of the coordinate system.
(5) The coordinates of all involved points are (in meters):
    a. Tx: (0, 0)
    b. Q_1: (50, 50)
    c. Q_2: (50, 110)
    d. A: (0, 70)
    e. B: (500, 70)
    f. C: (20, 0)
    g. D: (20, 500)

(6) The frequency is 1 GHz.
(7) Sampling step along lines is 5 cm.

3. Suggested procedure:

(1) Matlab programs for the calculation of diffraction coefficient will be provided as Matlab pcode. You can call the function using the same convention as in the Fortran code in [1] and in lectures.

4. Report:

a) The report should contain the following parts: Title, Author name(s), Abstract, Introduction (background and objectives), Formulation (main part of your report), Results (tables, figures showing your calculated results), Conclusions, and References.
b) An appendix listing your computer program with detailed comments and user instructions.
c) The format of the report: follow the IEEE "Templates for Transactions" at https://www.ieee.org/publications_standards/publications/authors/author_templates.html. A Word template will be available in Google Drive. The length of your report should not exceed five pages (Appendix not included).
d) Submit a hard copy and an electronic copy of your report and a plain text copy of your program (such as the .m files for Matlab).
e) No hand written report is acceptable.
f) The report should be sent to the EE671 Instructor before the presentation day.

5. Presentation date:

To be announced.
You are required to present your project. The presentation time is about 15 minutes followed by a Q&A session of 5 minutes.

6. Grading:

Report: 60%
Presentation: 40%

References

[1] C. Balanis, *Advanced Engineering Electromagnetics*, John Wiley & Sons, 1989.