



## Lab 4: Small-Scale Fading

### EE432: RF Engineering for Telecommunications

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#### Objectives

- To observe small-scale fading of a cellular radio channel.
- To analyze the spatial variations and statistics of this fading.

#### Equipment Needed

- AMPS field strength meter.
- Computer running Matlab.

#### Procedure

1. Using an AMPS field strength meter, measure the B-block control channel #345 (880.35MHz) on a square grid at two-inch intervals. Measure eight intervals in each dimension for a total of 64 field samples. Record your measurements in a square array keeping track of the spatial location corresponding to each measurement. Try to have everyone remain in the same place as you make your measurements.
2. Repeat your measurements for the A-block control channel #329 (879.87MHz).

#### Analysis

1. Put your measurements into Matlab. Produce contour plots of field strength in dBm vs. location. (The "contour" command will do this.)
2. Convert the dBm values into rms voltages across  $50\Omega$  using  $P(dBm) = 10\log\left(1000\frac{V^2}{50}\right)$ .

Make histograms of these voltages (Matlab's "hist" command will do this). Compare the results to the Rayleigh distribution discussed in section 4.6 of the text. Does the Rayleigh model give a reasonable description of the observed field strengths in these cases?