## Intro

Comsol slow. Hard coding for this one problem go fast.

## Method of Moments fun

The method of moments approach will be used to solve Electric Field Integral (EFIE) equation [EFIE EQ]. The plate is broken into equal sized rectangular squares. The current is expanded into a series representation using the well-known “roof-top” basis functions defined in [ROOFTOP EQ]. Because the roof-top function expands two adjacent cells, current is defined along the center of the edge of adjacent cells.

To create the N-equations necessary to solve the now N-unknowns, the expansion is tested by taking the inner product with the “razor blade” function defined in [RAZOR BLAD EQ]. The impedance matrix can now be found and the metal plate is fully described.

## Holes holes holes

Holes will be placed in the metal plate in attempt to optimize the Radar Cross Section (RCS). To fully represent the current across the remaining metal, single cells can not be removed. Cells are grouped together in pixels. The pixels will either be “on” (metal) or off (hole).

[PICTURE SHOWING PIXELS VS CELLS]

One problem with this approach however is if two metal sections touch at a corner, this formulation as stated does not represent that. To fix this a single cell can be used to connect the corners and current will then flow.

Once cells to be removed have been identified, holes can be added by removing corresponding edges

## Optimization

Matlab’s optimization toolbox was utilized. The code attempts to optimize the average Radar Cross Section (RCS) over multiple frequencies, elevation angles, and azimuthal angles. Because of symmetry, on angles between zero and must be considered. We found that pattern search and the genetic algorithm generally returned the same result, but pattern search was faster.

## Show example

## Rantings blarg!

I take the plate. The plate becomes a grid. Attempting to solve the Electric Field Integral (EFIE) equation [EFIE EQ]. The x-directed current lies on vertical lines. The y-directed current lies on the horizontal lines (show picture). This defines current along the edges of each cell