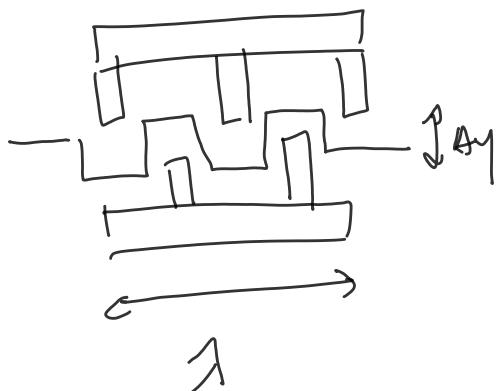


8×8
unit cells

Unit cell



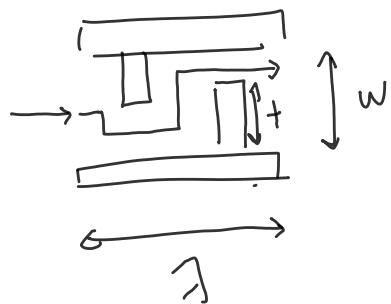
N
teeth = cell $N\Delta y$
distance to
propagate in average

Relative

Phase difference due to N teeth is $\frac{2\pi}{\lambda} \cdot N\Delta y$

We can use phase profile $\phi(r)$ of each unit cell to determine N that gives closest phase

Actually the paper's images look like each unit cell has 2 teeth with varying height. Then we can get an exact value for the phase needed.



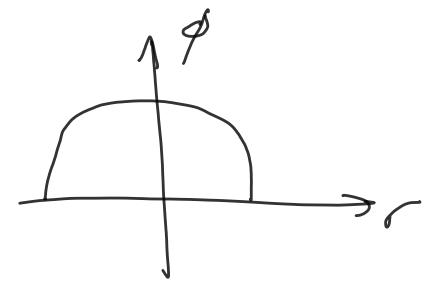
These teeth add path length of

$$\frac{w-t}{2} + \left(w - 2 \cdot \frac{w-t}{2} \right) = \frac{w+t}{2}$$

w fixed but we can pick any $t < w$.

Paper uses parabolic phase profile

$$\phi(r) = \phi_0 - A^2 r^2$$

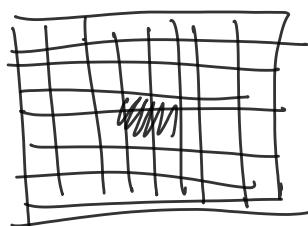


Let's say that maximum f to use is $f = 0.9w$

This gives maximum phase shift of $(0.9w) \times \frac{2\pi}{\lambda}$

This can be at the cells closest to center

$$\text{i.e. } r = \frac{S_2}{2}$$



$$\text{This gives } 0.9w \cdot \frac{2\pi}{\lambda} = \phi_0 - A^2 \cdot \frac{1}{2}$$

Compare this to the farthest cells (corners) located at $r = 2S_2$. Let's say these cells will have $f = 0.1w$

$$0.1w \cdot \frac{2\pi}{\lambda} = \phi_0 - A^2 \cdot 8$$

So we can solve for ϕ_0 and A .

Then we have $\phi(r) = \phi_0 - A^2 r^2$ for all the cells.

We can calculate the ϕ we will need at each cell center where r is from center to

where should we put the teeth? Probably
close together but idk

Should make the cell orientations rotationally
symmetric like in the paper