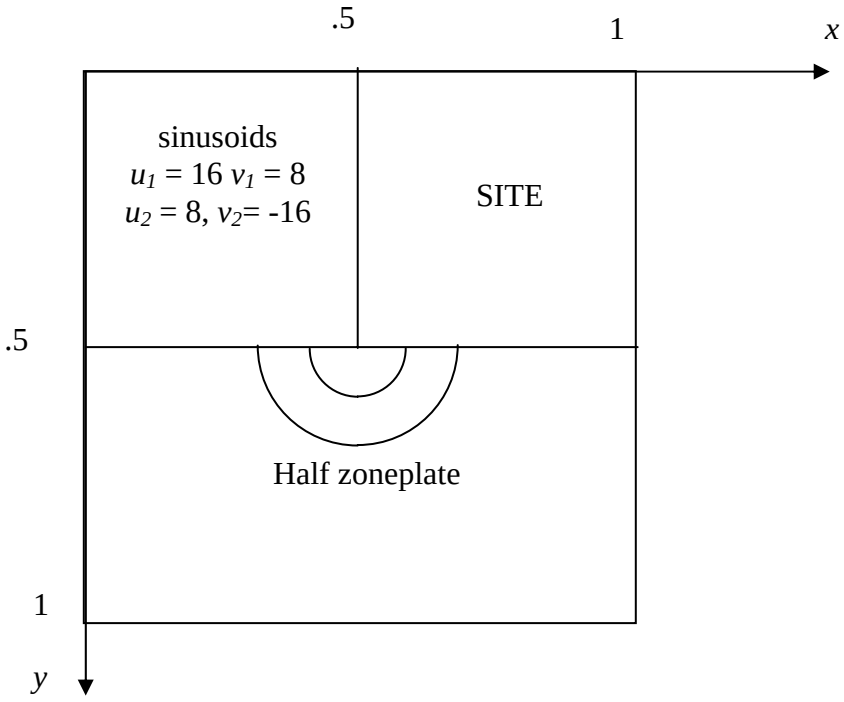
CEG4311 Image Processing
Sept. 19, 2007
Create an image test pattern

1. Create and display a square image (1 ph by 1 ph) consisting of 512 by 512 samples as follows.



This image can be defined mathematically in continuous space as below. This is simply ***notation*** and ***cannot*** be used in MATLAB! You should create three images A, B, C and mosaic them as Z= [A B; C]. Use same procedure as last week to generate A and C, of course making the appropriate adjustments to size, spacing, etc.

$$f_1(x,y) = (0.5 + 0.5\cos(\pi(x^2 + y^2)/r^2))\text{rect}(x, 2y - 0.5), \quad r = 0.075$$
$$f_2(x,y) = \text{SITE}(2x, 2y)$$
$$f_3(x,y) = (0.5 + 0.25\cos(2\pi(16x + 8y)) + 0.25\cos(2\pi(8x - 16y)))\text{rect}(2x - 0.5, 2y - 0.5)$$
$$\vec{\mathbf{f}} = T_{(.5,.5)}\vec{\mathbf{f}}_1 + t_{(.5,0)}\vec{\mathbf{f}}_2 + \vec{\mathbf{f}}_3$$

where T is the shift operator. The original continuous space SITE image is non-zero for $0 \le x, y \le 1.0$. You are given a 256×256 version on the web page that you can use as is.
Save the test image as a TIFF file, and make sure you can display the saved image. Experiment with other values of r, u_1, v_1, u_2, v_2. (Make them variables in your m-file.)

2. Take the square root of the image in two ways:

Z1 = sqrt(Z)
for i=1:512, for j=1:512, Z2(i,j) = sqrt(Z(i,j)) , end, end
Time each using tic, toc and compare. Also display both Z1 and Z2 and compare.