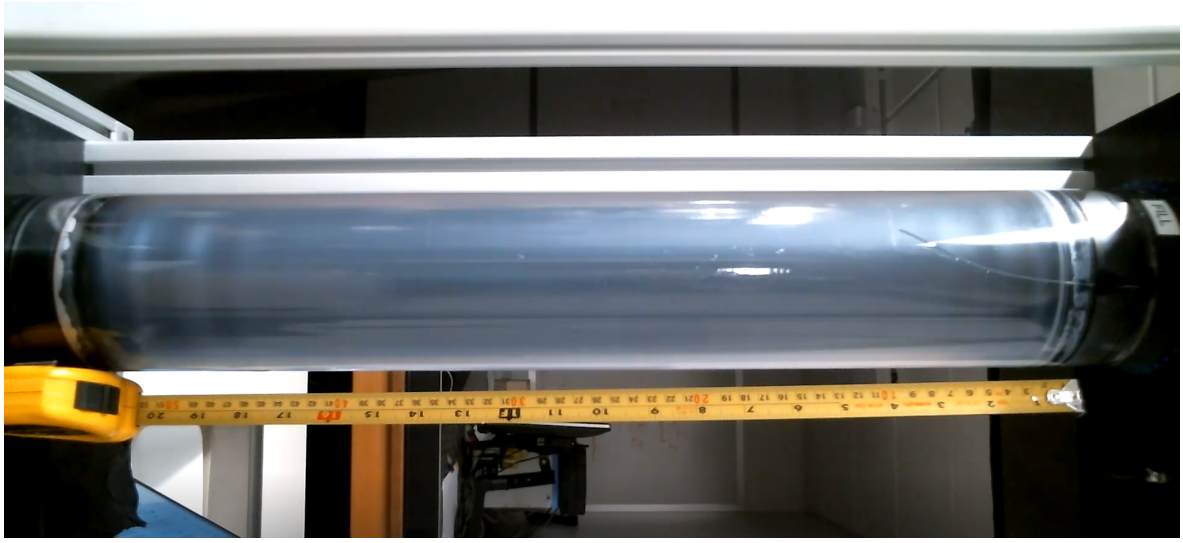
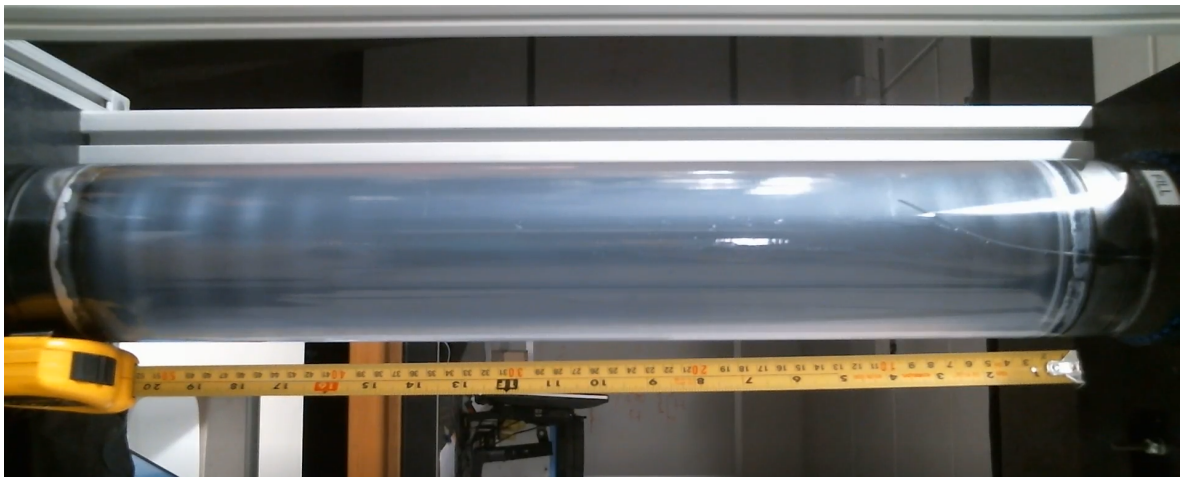
Experiment performed with lab temperature between 20 and 21 degrees celsius.

Predicted Reynolds number from pre-lab: $Re1 = 75.3439$ when $Re2 = 0$.

$Re1 = 65.0$ Actual $Re1 = 65.00$ $v1 = 0.695Hz$

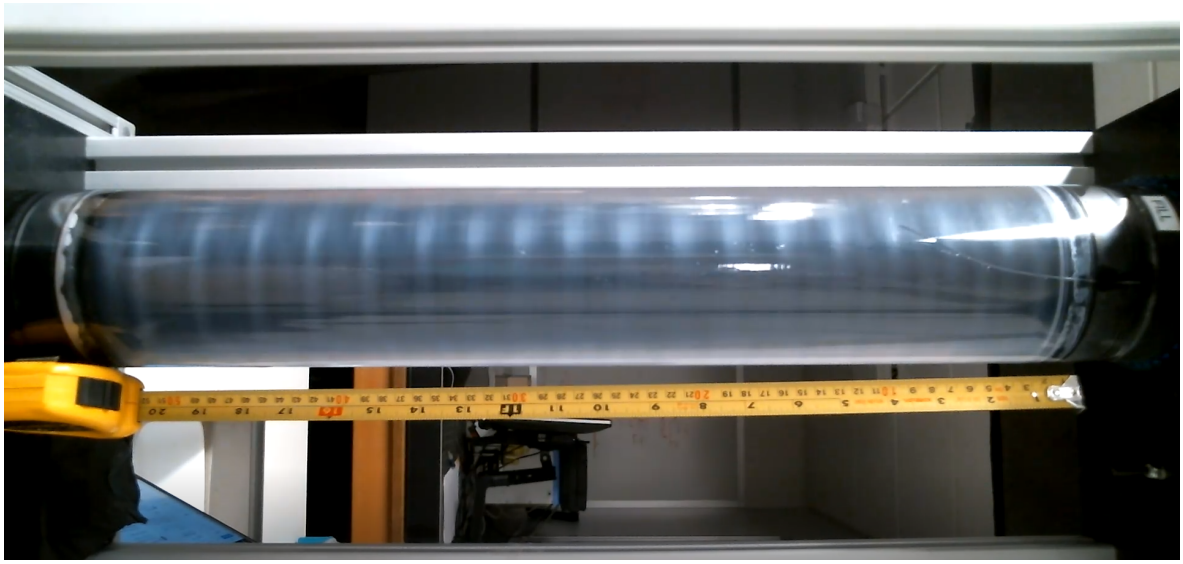


$Re1 = 67.5$ Actual $Re1 = 67.52$ $v1 = 0.722Hz$



$Re1 = 70.0$ Actual $Re1 = 69.96$ $v1 = 0.748Hz$

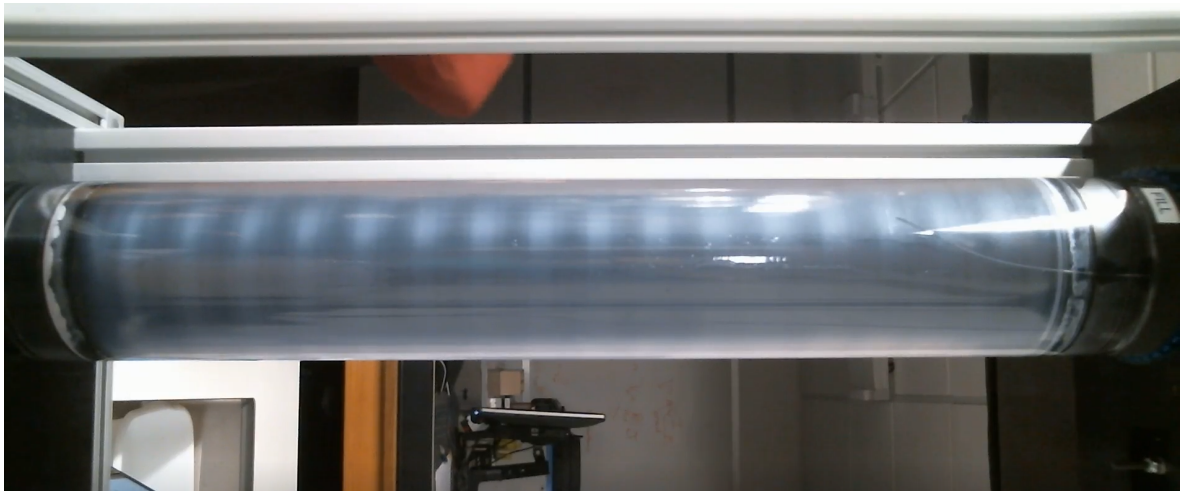
Re1 =72.5 Actual Re1 =72.48 v1 =0.775Hz



Re1 =75.0 Actual Re1 =75.01 v1 =0.802Hz

Re1 =68.5 Actual Re1 =68.46 v1 =0.732Hz

(Note: done on seperate run from the rest)



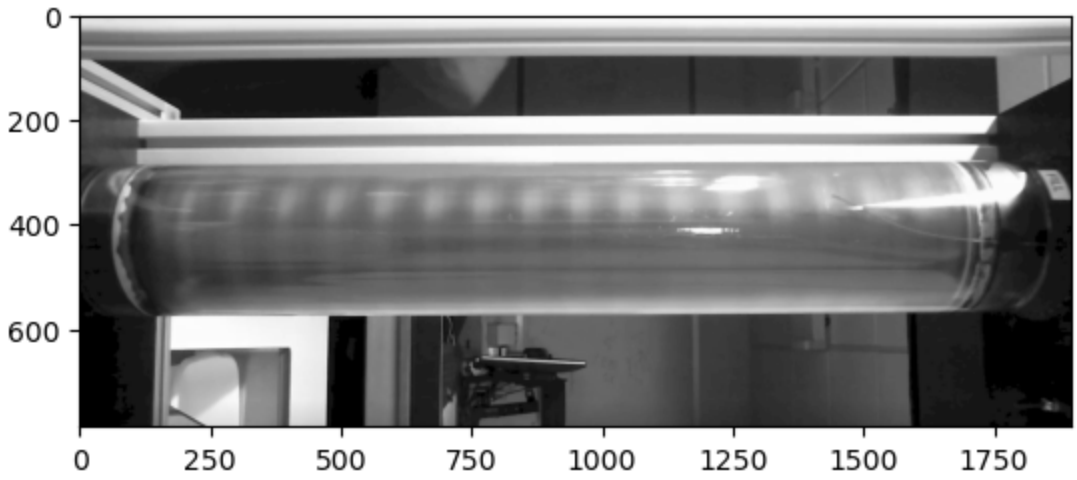
Print-out from lab code

```
Rotation rate v1 = 0.010692 * Re1
Rotation rate v2 = 0.007002 * Re2
Using port COM1
LD3
MC
b'A0.10\r'
1V0
1G
2V0
2G
TC> re1 65
Re1= 65.0
Actual Re1=65.00 v1=0.695/s
Setting CW rotation for cylinder 1
b'1H+\r'
b'1V0.695\r1G\r'
Waiting 6.950 seconds
Re1=65.00 v1=0.695/s
mu = 0.000
TC> re1 67.5
Re1= 67.5
Actual Re1=67.52 v1=0.722/s
b'1VC0.722\r'
Waiting 0.270 seconds
Re1=67.52 v1=0.722/s
mu = 0.000
TC> re1 70.0
Re1= 70.0
Actual Re1=69.96 v1=0.748/s
b'1VC0.748\r'
Waiting 0.260 seconds
Re1=69.96 v1=0.748/s
mu = 0.000
TC> re1 72.5
Re1= 72.5
Actual Re1=72.48 v1=0.775/s
b'1VC0.775\r'
Waiting 0.270 seconds
Re1=72.48 v1=0.775/s
```

In [4]:

```
#% matplotlib inline

import cv2
import numpy as np
from matplotlib import pyplot as plt

#filepath = '/Users/randalltagg/Documents/iPython Notebooks/Taylor Couette
#i=1
#imagefile = filepath+'img_'+str(i).zfill(4)+'.png'
imagefile = 'Pictures/68-5.png'
img = cv2.imread(imagefile,0)
print(img.shape)

plt.imshow(img,cmap = 'gray')
plt.show()
```

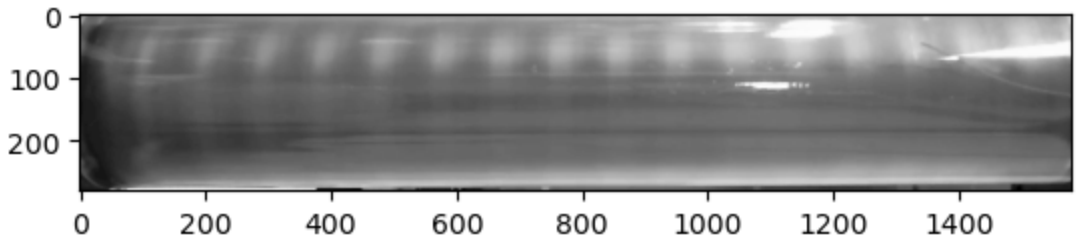
```
(787, 1899)
```



In [6]:

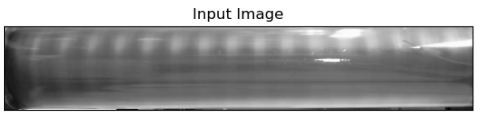
```
#% matplotlib inline

import cv2
import numpy as np
from matplotlib import pyplot as plt

ylower = 300
yupper = 580
xlower = 100
xupper = 1680

filepath = '/Pictures/68-5.png'
i=1
#imagefile = filepath+'img_'+str(i).zfill(4)+'.png'
#img = cv2.imread(imagefile,0)
print('Original image sizes',img.shape)

TC_column = img[ylower:yupper,xlower:xupper]
print('Ragion of interest sizes',TC_column.shape)


plt.imshow(TC_column,cmap = 'gray')
plt.show()
```

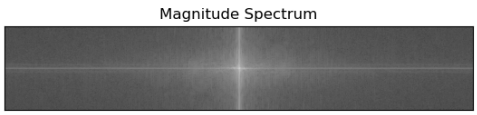
```
Original image sizes (787, 1899)
Ragion of interest sizes (280, 1580)
```

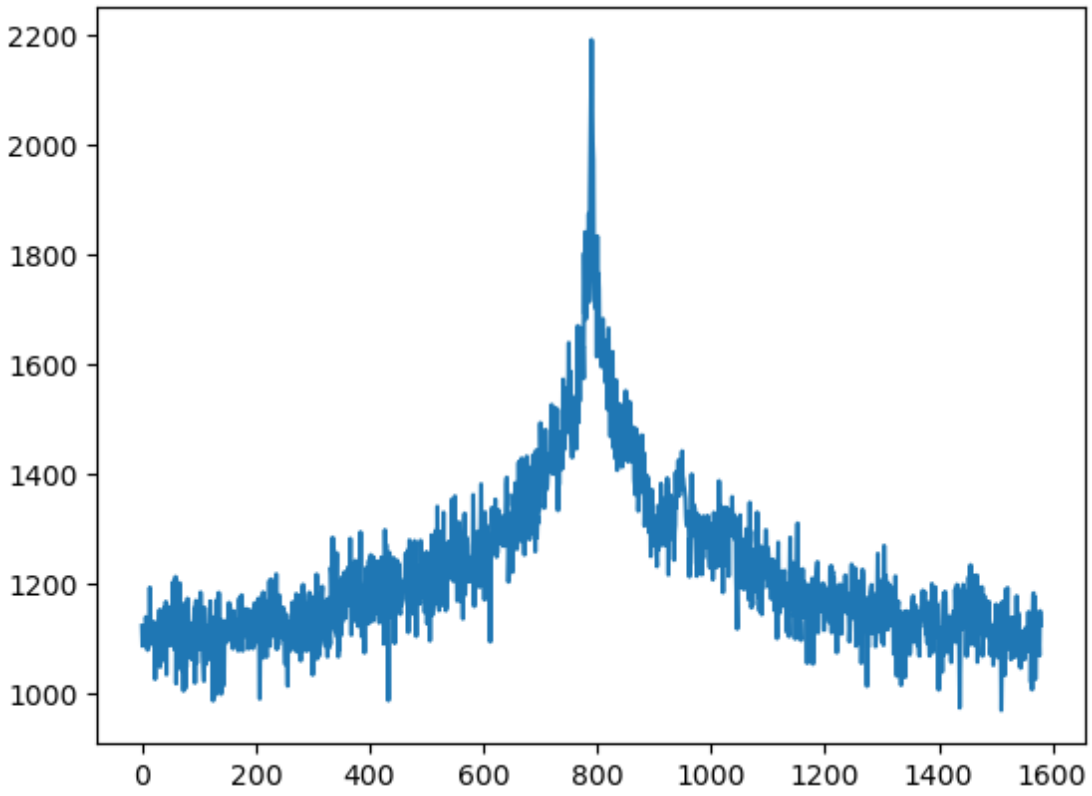


In [7]:

```
import cv2
import numpy as np
from matplotlib import pyplot as plt

#f = np.fft.fft2(TC_column[0:250,0:1300,0])
f = np.fft.fft2(TC_column)
fshift = np.fft.fftshift(f)
magnitude_spectrum = 20*np.log(np.abs(fshift))
ysize=np.size(magnitude_spectrum,axis=0)
xsize=np.size(magnitude_spectrum,axis=1)

plt.figure(0)
# See https://matplotlib.org/3.1.0/tutorials/colors/colormaps.html
plt.subplot(121),plt.imshow(TC_column, cmap = 'gray')
plt.title('Input Image'), plt.xticks([]), plt.yticks([])
plt.subplot(122),plt.imshow(magnitude_spectrum, cmap = 'gray')
#plt.subplot(122),plt.imshow(magnitude_spectrum, cmap = 'rainbow')
plt.title('Magnitude Spectrum'), plt.xticks([]), plt.yticks([])
plt.subplots_adjust(top=0.92, bottom=0.08, left=0.10, right=2.0, hspace=0.

yrow = 55
plt.figure(1)
kx = np.arange(xsize)
Skx = np.zeros(xsize)
# Sum several rows of the 2D spectrum
for i in range(yrow-5,yrow+5):
    Skx = Skx + magnitude_spectrum[i,0:xsize+1]
plt.plot(kx,Skx)
plt.show()
```






2200
2000
1800
1600
1400
1200
1000
0
200
400
600
800
1000
1200
1400
1600

In [ ]: