In [273]:
```
from math import *
import numpy as np
import sympy as sp
import matplotlib.pyplot as plt
sp.init_printing(use_unicode=True, use_latex='mathjax')
%matplotlib inline
```

This is for a side-arm slider. That means that the spin is perfectly horizontal.

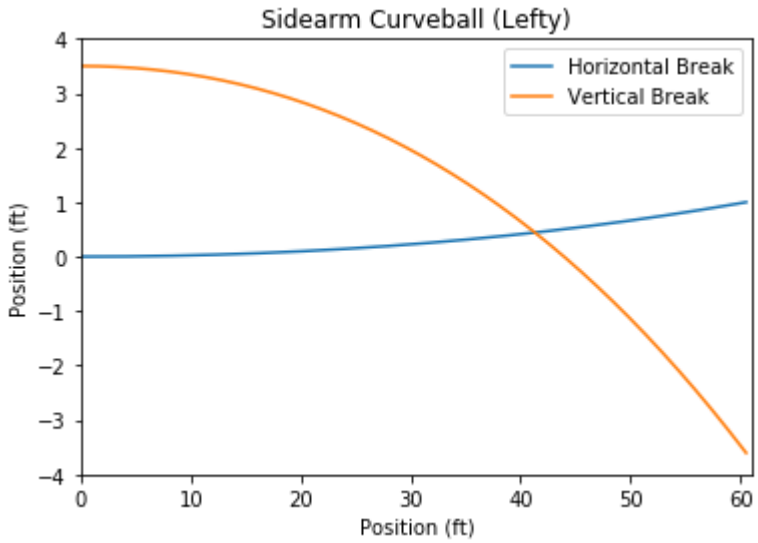
For this, the x-axis is the mound to home plate, y-axis is height above ground, and z-axis is horizontal deflection with the positive being to the left of home plate.

In [274]:
```
xpos=[]
ypos=[]
zpos=[]
xvel=[]
yvel=[]
zvel=[]
vd = 35
delta = 5
m = 0.149
delT = .001
xpos.append(0)
ypos.append(3.5)
zpos.append(0)
theta = 0
v = 102.667   #(ft/s) or 70 MPH
yvel.append(0)
xvel.append(v * cos(theta))
zvel.append(0)
g = 32.174 #In feet
S0 = 0.00005945
w = 30  #rad/sec
count = 0
```

In [275]:
```
B2 = (0.0039 + (0.0058/(1+exp((v-vd)/delta))))*m
```

In [276]:
```
while (xpos[count] <= 60.5):
    v = (xvel[count]**2 + yvel[count]**2 + zvel[count]**2)**0.5
    xpos.append(xpos[count] + xvel[count]*delT)
    ypos.append(ypos[count] + yvel[count]*delT)
    zpos.append(zpos[count] + zvel[count]*delT)
    xvel.append(xvel[count] - (B2*v*xvel[count]/m)*delT)
    yvel.append(yvel[count] - g*delT)
    zvel.append(zvel[count] + (4*S0*xvel[count]*w/m)*delT)
    count = count + 1
```

In [277]:
```
plt.plot (xpos, zpos, label = 'Horizontal Break')
plt.plot (xpos, ypos, label = 'Vertical Break')
plt.xlabel ("Position (ft)")
plt.ylabel ("Position (ft)")
plt.xlim (0, 61)
plt.ylim (-4,4)
plt.title("Sidearm Curveball (Lefty)")
plt.legend();
```



In [ ]:

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