Lab 6

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Nonlinear Dynamic Systems , Fall 2020

Chaos Game

Experiment goals:

- Introduce dynamical systems and flows
- Model simple trajectory and observe initial condition changes

Introduction

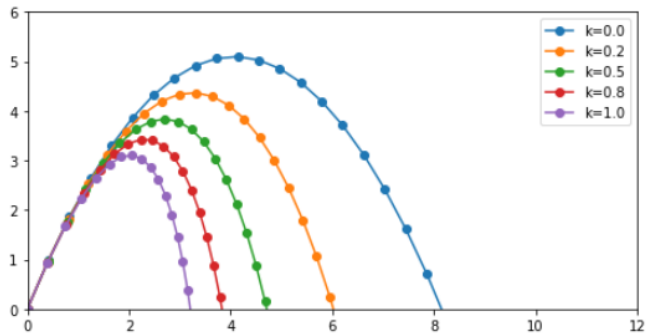
Why is this important?

- Many systems in the real world are continuous and multidimensional in nature

Trajectories

In the lab we simulated projectile motion through solving the differential equations that arise when applying newton's laws to this case.

```
fig, ax = plt.subplots(1, 1, figsize=(8, 4))

t = np.linspace(0., 3., 30)

for k in np.linspace(0., 1., 5):

    v = spi.odeint(f, v0, t, args=(k,)) #iteratively solves diffenetial equatiosn

    ax.plot(v[:, 0], v[:, 1], 'o-', label=f'k={k:.1f}') #plot each

ax.legend()
ax.set_xlim(0, 12)
ax.set_ylim(0, 6)
```



Analysis and Conclusion

In conclusion, this system does not demonstrate chaotic behavior. This continuous model was solved by solving differential equations of the motion of the projectile.