Lab 6

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Nonlinear Dynamic Systems , Fall 2020

Projectile Motion

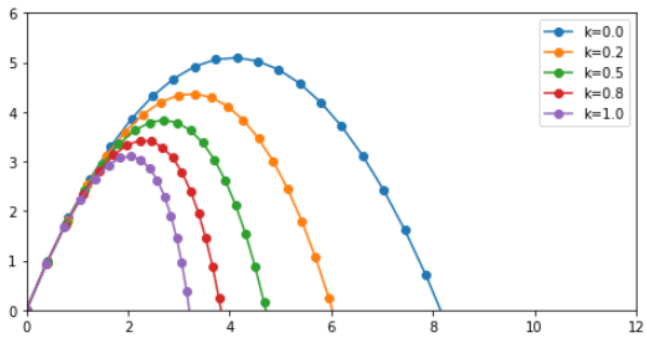
Experiment goals:

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

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.