

Applications of Non-Linear Systems

There are two main population type models that are formed and discussed in the context of non-linear systems. These are competing species models and predator-prey models.

Example. Consider the system below. Find and classify all equilibrium solutions of the system.

$$\frac{dx}{dt} = x(3 - x - y) \quad \frac{dy}{dt} = y(3 - 2y - 0.5x)$$

Which of the two models does this fit?

Example. Analyze the system

$$\frac{dx}{dt} = -x + 0.2xy \quad \frac{dy}{dt} = 2y - 0.4xy.$$