# Synchronous Oscillatory Solutions in a Two Patch Predator-Prey Model

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## Outline

Introduction Predator-Prey Background Synchrony



Synchrony in a Two Patch Model

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Predator-Prey Background

# Predator-prey model

- Predator-Prey models are differential equations that model the interaction between two species. One species gains from this interaction while the other is hurt.
- These models are used to study the dynamic behavior of interacting species.
- The dynamics of each population depends upon the other.



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## **Two Patch Model**

- There are two different populations in two different geographic populations, but the populations can disperse from one patch to the other.
- Prey and predator may have different diffusion coefficients.





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Predator-Prey Background

#### Lynx and Hare





Tribe.

#### Synchrony in a Two Patch Model

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# Lynx and Hare

The Lynx-Hare model is the most well known applied predator-prey model.



The Hudson Bay Company kept records of the populations over one hundred years. This is possibly the most pure example of predator-prey dynamics in nature.

Synchrony

## Introduction

- Synchronization is the process in which oscillations attain the same frequency based on their coupling.
- Due to the diffusion, along with other factors, between two patches, the populations in each patch may become synchronized over time.



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## Examples



Figure: Coupled pendulums are typical coupled oscillators which may synchronize.



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Figure: Fireflies synchronize their flashes in order to extend the distance the light can be seen.

