

# Food Web Control and Synchronization using a Robust Feedback

Héctor Puebla, Mariana Rodríguez-Jara, Cesar S. Lopez-Monsalvo

*División de Ciencias Básicas e Ingeniería, Universidad Autónoma Metropolitana Azcapotzalco*

Eliseo Hernández-Martínez, Alejandra Velasco-Pérez

*Facultad de Ciencias Químicas, Universidad Veracruzana*

## Abstract

Food webs are used to describe feeding relationships in an ecosystem. Simple and complex dynamical behavior can be displayed in food web chains. From an ecological viewpoint, unstable and chaotic behavior are two dynamical problems of food web ecosystems that may require the introduction of control actions to drive the system to the desired behavior. In this work, we introduce a robust feedback control approach for control and synchronization of populations in food webs. The control design is based on a cascade control structure in conjunction with a simple and robust feedback. Numerical simulations on two case studies, a three trophic food chain model and a bioreactor model with four microbial populations.

Keywords: Food web, chaotic populations, synchronization, feedback control.