



Mathematical Biology Seminar

Monday, November 4, 2024

3 pm MDT - 457 CAB (in person)

Join Zoom Meeting

<https://ualberta-ca.zoom.us/j/97624718507>

Meeting ID: 976 2471 8507



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Canards and relaxation oscillations in slow-fast ecological models: A dynamical approach

The interactions among species in a food web or food chain are inherently complex. Mathematical models provide a framework to closely represent the dynamics observed in ecosystems. However, capturing this complexity within a single mathematical setup is extremely challenging. Biological phenomena such as growth, death, and interactions among species occur across multiple timescales. Here, I will demonstrate the importance of a multiscale framework in mathematical modelling to study the dynamics of interacting species. By applying geometric singular perturbation and blow-up theory, I will discuss the existence of canards and relaxation oscillations in ecological models, and illustrate how the entry-exit function helps in determining critical thresholds associated with sudden transitions in population density. I will illustrate how incorporating diverse timescales into mathematical models can provide new insights into capturing the large amplitude periodic fluctuations observed in ecosystems. Further, I will discuss how slow-fast systems can help in understanding the long transients observed in the ecological datasets.

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