明治大学先端数理科学インスティテュート

# MIMS現象数理カフェセミナー

日時：2025年12月17日（水）（12:40 – 13:20）

場所：中野キャンパス8階　談話室

## Oscillatory dynamics in coupled biological rhythms

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**Abstract**：Biological rhythms can be modeled mathematically as coupled-cell systems described by ordinary or delay differential equations. Many biological rhythms arise from interactions among single-cell oscillators connected through intercellular coupling. A population of oscillators with different autonomous frequencies can generally attain frequency synchronization through coupling. Thus, understanding how to establish the frequency of a collective oscillation is a key issue in understanding biological rhythms. We consider gene regulation models for circadian clocks and for somitogenesis in zebrafish embryos. Based on Hopf bifurcation analysis and numerical computations, we explore how the collective frequency in the coupled-cell systems varies with respect to the coupling strength. Moreover, we investigate the relationship between the collective frequency of oscillation in coupled-cell systems and the frequencies of isolated individual cells.

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