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

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## Global feedback for coupled Belouzov–Zhabotinsky oscillators: competition between global feedback and diffusion

Kota Ohno
Gradate School of Advanced Mathematical Sciences,
Meiji University

**Abstract:** Pattern dynamics has been drawing attention in many research fields. Further, it has been explained using mathematical models. The Belousov–Zhabotinsky (BZ) reaction is a famous experimental model for chemical oscillatory reaction and pattern formation. One can also control the pattern dynamics of the BZ reaction with Ruthenium catalysts by light illumination. Using this property, Vanag et. al. studied global feedback system for the photosensitive BZ reaction and observed anti-phase like oscillations such as standing waves in experimentally. We herein study a simple situation, i.e., diffusive coupled system of two oscillators with global feedback using the photosensitive BZ reaction, to clarify the type of mechanism that causes such anti-phase like behavior both experimentally and theoretically. We observed an in-phase oscillation and two types of anti-phase like oscillations. One is a typical anti-phase oscillation and the other is an alternate oscillation in which each oscillator shows strong and weak peaks alternately. Moreover, we analyzed our model to locate the bifurcational origin and found the reconnection of the bifurcation branches for both anti-phase like oscillations, which was induced by the competition between global feedback and diffusion effect.

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問い合わせ：　Yu Uchiumi
Email: uchiumi.yu@gmail.com