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2022

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May 20th, 10:30 AM - 11:00 AM

## 2D Spatio-temporal Patterns in Coupled Phase Oscillators: Spiral Waves and Chimeras

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# 2D Spatio-temporal Patterns in Coupled Phase Oscillators: Spiral Waves and Chimeras

Yujie Ding

April 16, 2022

It is now clear that much of what was once regarded as synchronous oscillatory dynamics in the brain actually takes the form of various types of spatio-temporal activity in the form of traveling waves and rotating waves. A natural platform for the modeling on the spatio-temporal dynamics of filtered LFP is phase equations, that is equations that govern the dynamics of the phases of networks of oscillators:

$$u_t = \omega(x) + \int_D W(x-y)H[u(y,t) - u(x,t)]$$

where  $u(x,t)$  is the phase of the oscillator at a point  $x \in D$ , the two-dimensional domain.  $W(x)$  is a coupling kernel and  $H(u)$  is the phase-interaction function.

In this talk, I will discuss the existence and stability of rotating waves on annulus. I will show that as the inner radius shrinks, rigid rotating waves lose existence through a saddle-node bifurcation and this results in the birth of so-called chimeras.