

NTT-CS Talk Announcement

“Synchronization of Chaos in Lasers and Neural Systems”

2008年9月8日(月) 16:30 - 18:30

会場: NTT コミュニケーション科学基礎研究所

プログラム(Program):

- 16:30～ “Synchronization of Chaos in Lasers and Neurons”
Ingo Fischer (Heriot-Watt University, U.K)
- 17:10～ “Chaos-based Communication Field Experiments in Europe”
Claudio Mirasso (Universitat de les Illes Balears, Spain)
- 17:50～ “Fluctuation and Synchronization in Brain Dynamics”
Michael Breakspear (University of New South Wales, Australia)

レーザー工学や脳科学の分野から、複雑な振動現象の解析とその応用に関する最新の研究トピックスの紹介をしていただきます。特に共通の課題として、遅延結合を伴った多自由度の非線形振動システムに現れる珍しい同期現象について解説をしていただきます。信号処理や情報理論の分野の方にも興味深い内容です。

主催 (Host): NTT Communication Science Laboratories

共済 (Co-host): IEEE Kansai Section

アクセス:

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<http://www.kecl.ntt.co.jp/rps/visitor/keihanna-j.html>

(バス時刻表検索[奈良交通]: <http://jikoku.narakotsu.co.jp/form/asp/>)

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アブストラクト(Abstracts)

(1) “Synchronization of Chaos in Lasers and Neurons” (Ingo Fischer)

Lasers show rich dynamical behaviors which could be useful for applications such as optical sensing and secure optical communications, as well as providing a laboratory for exploring universal dynamical mechanisms which help us understand oscillatory properties of various networks of coupled oscillators, including a case where the coupling signal shows neither correlation nor mutual information with the synchronized dynamics, and self-organization of zero time-lag synchronization among remote oscillators.

(2) “Chaos-based Communication Field Experiments in Europe” (Claudio Mirasso)

Data transmission using chaotic optical carriers is being studied with the objective of realizing new methods to enhance security at high transmission rates in optical fiber networks. In this talk we explain the main characteristics of data transmission using chaotic optical carriers, including the synchronization and nonlinear filtering properties of receiver lasers. Objectives and achievements of the European projects OCCULT and PICASSO will be reviewed, including experimental results on Gbit/s message encryption/decryption over long distance (> 100 km) in the metropolitan area optical fiber network of Athens.

(3) “Fluctuation and Synchronization in Brain Dynamics” (Michael Breakspear)

We explain how stochastic fluctuations play a crucial role in large-scale neuronal activity and embody key cognitive processes such as uncertainty and ambivalence. And we show how nonlinear dynamics shape neural noise, with features manifest in large scale measures of brain activity, EEG and functional neuro-imaging. We also describe how information theoretic methods can be used to characterize dynamical connectivity in the brain, including multi-scale intermittent synchronization activity.