講演会

講演： **ランダム摂動による多チャンネル制御システムの解析**
Multi-channel control system analysis via small random perturbations

講師： **Getachew K. Befekadu 博士 (ノートルダム大学 電気工学科)**

日時： 2014 年 7 月 7 日 (月) 10:30〜12:30 ※セミナー形式

場所： 大阪大学 吹田キャンパス情報科学研究科 B 棟 1 階 B101 室 (住所：吹田市山田丘 1–5)

内容： **Part I: Relating maximum entropy, resilient behavior and game-theoretic equilibrium feedback operators in multi-channel systems**

In this talk, we first draw a connection between the existence of a stationary density function (which corresponds to an equilibrium state in the sense of statistical mechanics) and a set of feedback operators in a multi-channel system that strategically interacts in a game-theoretic framework. In particular, we show that there exists a set of (game-theoretic) equilibrium feedback operators such that the composition of the multi-channel system with this set of equilibrium feedback operators, when described by density functions, will evolve towards an equilibrium state in such a way that the entropy of the whole system is maximized. As a result of this, we are led to study, by a means of a stationary density function (i.e., a common fixed-point) for a family of Frobenius-Perron operators, how the dynamics of the system together with the equilibrium feedback operators determine the evolution of the density functions, and how this information translates into the maximum entropy behavior of the system. Later, we use such results to examine the resilient behavior of this set of equilibrium feedback operators, when there is a small random perturbation in the system.

Part II: On the problem of minimum asymptotic exit rate for stochastically perturbed multi-channel dynamical systems

In this second talk, we consider the problem of minimizing the asymptotic exit rate (from a given bounded open domain) for the state-trajectories of a multi-channel dynamical system with an asymptotically small random perturbation. In particular, for a class of admissible stabilizing state-feedbacks, we show that the existence of a minimum asymptotic exit rate for the state-trajectories from the given domain is related to an asymptotic behavior (i.e., a probabilistic characterization) of the principal eigenvalue of the infinitesimal generator that corresponds to the stochastically perturbed dynamical system. Finally, we remark briefly on the implication of our result for evaluating the performance of the stabilizing state-feedbacks for the unperturbed multi-channel dynamical system.

略歴： Getachew K. Befekadu received his Ph.D. degree in electrical engineering from the University of Duisburg-Essen, Germany in 2006. He is currently a research assistant professor at the Department of Electrical Engineering, University of Notre Dame. He was a Moreau research fellow at the Department of Electrical Engineering, University of Notre Dame. He was also a Postdoctoral Research Fellow with Lombardi Comprehensive Cancer Center at Georgetown University, Washington, DC. His research interests include robust decentralized control design with coordination among controller agents for large scale systems, application of optimization in power systems, hybrid systems and nonlinear control.

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