

Topic:

Random Matrix Theory for Signal Processing Applications



Presenter:

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Date:

December 16th, 2011, 12:30 – 16:00

Locations:

Johannes Kepler University Linz (details to be announced)

Abstract:

The generalization of multi-user multi-antenna communication systems as well as large radar arrays has lead researchers and engineers in telecommunications and array processing to cope with large dimensional stochastic problems. The random parameters in these systems are no longer simple variables but potentially large vectors and matrices.

The first purpose of this tutorial is to provide a rigorous introduction to the major tools of both finite and asymptotic aspects

of Random Matrix Theory, and their application to the field of Wireless Communications and Signal Processing. Specific examples of capacity estimation in complex communication networks, as well as improved signal detection and estimation (statistical inference) tests will be used as practical applications of the first part of the tutorial.

The outline of the tutorial is as follows:

- Random Matrix Theory: from small to large systems, limiting eigenvalue distributions, deterministic equivalents, spectrum analysis and statistical inference.
- Applications: capacity estimation in MIMO and CDMA channels, generalization to large communication systems, signal detection tests and statistical inference methods for array processing (DoA, power estimation).
- What's left?: outlook on on-going research in telecommunication (small cell networks), array processing (robust estimation, position tracking), signal processing (failure diagnosis).

Biography:

Romain Couillet received his MSc in Mobile Communications at the Eurecom Institute and his MSc in Communication Systems in Telecom ParisTech, France in 2007. From 2007 to 2010, he worked with ST-Ericsson as an Algorithm Development Engineer on the Long Term Evolution Advanced project, where he prepared his PhD with Supelec, France, which he graduated in November 2010. He is currently an assistant professor in the EDF Chair "Systems Science and the Energetic Challenge" in Supelec and Centrale Paris, France. His research topics are in information theory, signal processing, complex systems and random matrix theory. He is the recipient of the Valuetools 2008 best student paper award and of the 2011 EEA/GdR ISIS/GRETSI best PhD thesis award.

Registration:

We ask for a registration (free of charge) to help us with the organisation.

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