T8. Random Matrix Theory for Advanced Communication Systems

Abstract:

This tutorial focuses on the application of random matrix theory (RMT) to the performance analysis of advanced wireless communication systems. The main target is to provide the attendee with a rigorous understanding of the most important results of RMT and to present a powerful methodology to treat a wide range of research problems related to large multiple-input multiple-output (MIMO) systems. Starting from first principles, we introduce several classical convergence results, the Stieltjes transform, key lemmas and proof techniques and motivate the concept of (iterated) deterministic equivalents. The theoretical results are then applied to the study of small-cell systems, large antenna arrays, multi-hop relay and doubly scattering channels, as well as random beamforming techniques.

Speaker's Biography:
Mérouane Debbah, SUPELEC, France
Jakob Hoydis, SUPELEC, France

Prof. Merouane Debbah was born in Madrid, Spain. He entered the Ecole Normale Superieure de Cachan (France) in 1996 where he received the M.Sc and the Ph.D. degrees respectively in 1999 and 2002. From 1999 to 2002, he worked for Motorola Labs on Wireless Local Area Networks and prospective fourth generation systems (OFDM and MC- CDMA). From 2002 until 2003, he was appointed Senior Researcher at the Vienna Research Center for Telecommunications (ftw., Vienna, Austria) working on MIMO wireless channel modeling issues. From 2003 until 2007, he joined the Mobile Communications department of 4 the Institute Eurecom (Sophia Antipolis, France) as an Assistant Professor. He is presently a Professor at Sup_elec (Gif-sur-Yvette, France), holder of the Alcatel-Lucent Chair on exible radio. His research interests are in information theory, signal processing and wireless communications.

Jakob Hoydis was born in Berlin, Germany. He obtained the diploma degree (Dipl.-Ing.) in Electrical Engineering and Information Technology from RWTH Aachen University, Germany, in 2008. From 2008 until 2009, he was a research assistant at the Department of Wireless Networks, RWTH Aachen University. Since May 2009, he is a PhD student at the Department of Telecommunications and the Alcatel-Lucent Chair on Flexible Radio, Supelec, France. From May-July 2011 he was a visiting researcher at Bell Labs, Alcatel-Lucent, Stuttgart, Germany. His research interests include mobile communication systems, large-scale and network MIMO, small-cell networks, random matrix and information theory.