

Super Resolution Blind Channel-and-Signal Estimation in Massive MIMO Systems

Abstract: In this talk, I will introduce a blind channel-and-signal estimation method that exploits the burst-sparse structure of angular domain propagation channels in massive MIMO systems. The state-of-the-art approach utilizes the structured channel sparsity by sampling the angular-domain channel representation with a uniform angle-sampling grid, a.k.a. virtual channel representation. However, this approach is only applicable to uniform linear arrays and may cause a substantial performance loss due to the mismatch between the virtual representation and the true angle information. To tackle these challenges, we propose a sparse channel representation with a super-resolution sampling grid and a hidden Markovian support. Based on this, we develop a novel approximate inference based blind estimation algorithm to estimate the channel and the user signals simultaneously, with emphasis on the adoption of the expectation-maximization method to learn the angle-information. Furthermore, we demonstrate the low-complexity implementation of our algorithm, making use of factor graph and message passing principles to compute the marginal posteriors.

Bio: Yingjun Angela Zhang is currently an Associate Professor. Her research interests include mainly wireless communications systems and smart power systems, in particular optimization techniques for such systems. She serves as the Chair of the Executive Editor Committee of the IEEE Transactions on Wireless Communications. Previously, she served many years as an Associate Editor of the IEEE Transactions on Wireless Communications, IEEE Transactions on Communications, Security and Communications Networks (Wiley), and a Feature Topic in the IEEE Communications Magazine. She has served on the organizing committee of major IEEE conferences including ICC, GLOBECOM, SmartgridComm, VTC, CCNC, ICC, MASS, etc.. She is now the Chair of IEEE ComSoc Technical Committee on Smart Grid Communications. She was the co-recipient of the 2014 IEEE ComSoc APB Outstanding Paper Award, the 2013 IEEE SmartgridComm Best Paper Award, and the 2011 IEEE Marconi Prize Paper Award on Wireless Communications. She was the recipient of the Young Researcher Award from the Chinese University of Hong Kong in 2011. As the only winner from engineering science, she has won the Hong Kong Young Scientist Award 2006, conferred by the Hong Kong Institution of Science. Dr. Zhang is a Fellow of IET and a Distinguished Lecturer of IEEE ComSoc.