



THE CHINESE UNIVERSITY OF HONG KONG
Department of Information Engineering
Seminar

**Reconfigurable Intelligent Surface Aided MIMO Communications:
Challenges and Opportunities**
by

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Time : 11:00am to 12:00pm

Venue : Room 801, Ho Sin Hang Engineering Building, CUHK

Abstract

Reconfigurable intelligent surface (RIS) is regarded as one of the candidate technologies to enable next-generation wireless communications (6G). A RIS is made of a large number of low-cost reconfigurable elements, a.k.a. meta-atoms or unit cells, that are able to control how incident electromagnetic (EM) waves are reflected. The unit cells of a RIS can be designed to cooperatively achieve specific purposes, such as scattering the impinging waves, absorbing the impinging waves, and focusing the reflected wave to certain directions. In this talk, we introduce the channel modeling, optimization, and capacity analysis of RIS-assisted MIMO systems. First of all, we propose a partition-based passive beamforming method to reduce the number of variables to be optimized, thereby reducing computational overhead. Then, we propose a near-field RIS-assisted MIMO channel model based on the spherical-wave assumption. Based on the established channel model, we study the spatial multiplexing capability of the cascaded line-of-sight MIMO channel, and analyze the capacity of the system by jointly optimizing the active and passive beamforming, and the transceiver array orientations.

Biography

Xiaojun Yuan received the Ph.D. degree in electrical engineering from the City University of Hong Kong in 2009. From 2011 to 2014, he was a Research Assistant Professor with the Institute of Network Coding, The Chinese University of Hong Kong. He is currently a professor with the University of Electronic Science and Technology of China. His research interests include signal processing, machine learning, and wireless communications, including but not limited to intelligent communications, structured signal reconstruction, Bayesian approximate inference, and distributed learning. He has published over 200 peer-reviewed research papers in the leading international journals and conferences in the related areas. He has served on several technical programs for international conferences. He was a co-recipient of the IEEE Heinrich Hertz Award for Best Communication Letter in 2022. He was an Editor of a number of IEEE leading journals, including IEEE Transactions on Wireless Communications and IEEE Transactions on Communications.

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