



**THE CHINESE UNIVERSITY OF HONG KONG**  
Department of Information Engineering  
*Seminar*

**Orthogonal Delay-Doppler Division Multiplexing (ODDM):  
A Novel Delay-Doppler Domain Multi-Carrier Waveform**

**By**

**Prof. Hai Lin**

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**Date : 13 October 2023 (Friday)**

**Time : 4:00pm – 5:00pm**

**Venue : Rm 833, Ho Sin Hang Engineering Building, CUHK**

Abstract

In this talk, we will first review the model of linear time-varying (LTV) channels from the delay-Doppler (DD) domain, and discuss the LTV channels' DD domain impulse response. Next, we revisit the fundamentals of multi-carrier (MC) modulation, including the transmission strategy, the pulse design principles and the implementation methods. Then, we propose an impulse function based transmission strategy for LTV channels, and design the corresponding general delay-Doppler multi-carrier (DDMC) modulation. By introducing the newly discovered delay-Doppler domain orthogonal pulse (DDOP), we present the DDOP-based orthogonal delay-Doppler division multiplexing (ODDM) modulation. We show perfect orthogonality property of the DDOP with respect to DD resolutions using its ambiguity function, which infers that the proposed ODDM/DDMC waveform is suitable for future integrated sensing and communications (ISAC) systems.

Biography

Hai Lin received the B.E. degree from Shanghai JiaoTong University, China, in 1993, and the Dr. Eng. degree from Osaka Prefecture University, Japan, in 2005. In 2000, he joined the Graduate School of Engineering, Osaka Prefecture University (renamed Osaka Metropolitan University in 2022), where he is currently a Professor. Prof. Lin received the Best Paper Award from IEEE GLOBECOM 2018. He has served as technical program co-chair for symposium/track of international conferences, including IEEE ICC 2011, 2013, IEEE GLOBECOM 2013, 2020, IEEE WCNC 2019, 2021. He was the Chair of the Signal Processing and Communications Electronics Technical Committee, IEEE Communications Society, from 2015 to 2016. Currently, he is the Chair of the IEEE Communications Society Kansai Chapter. Prof. Lin was an Associate Editor of the IEEE Transactions on Wireless Communications and now is an Associate Editor of the IEEE Transactions on Communications and the IEEE Transactions on Vehicular Technology. His current research interests include wireless communications and statistical signal processing.

**\*\* ALL ARE WELCOME \*\***