

國立陽明交通大學 電信工程研究所 系統組 論文研討

# A Unified Framework for Modulation-Level Coding

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# Abstract

Modern modulation schemes are often carefully designed for specific system requirements, making it difficult to incorporate channel coding and achieve full coded modulation gain. This talk presents a simple modulation-level coding framework that partitions uncoded signal sequences and adds asymptotically vanishing redundancy through a finite-state structure. The proposed framework preserves the original signal constellation while introducing memory into memoryless modulators, thereby reshaping the distance structure of transmitted sequences and enabling optimal sequence detection via the Viterbi algorithm. Two case studies, sparse code multiple access and spatial modulation, are presented to show how the proposed idea can create coding gain in different modulation systems.

# Biography

Jian-Jia Weng received his Ph.D. degree from the Department of Mathematics and Statistics at Queen's University, Canada, in 2020. He then worked as a postdoctoral fellow in the same department. From August 2021 to July 2023, he was an Assistant Professor in the Department of Electrical Engineering at National Taiwan Ocean University. Since August 2023, he has been an Assistant Professor in the Department of Communications Engineering at National Chung Cheng University, Taiwan. His research interests include source coding, error-correction codes, information theory, and wireless communications.