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## **Experimental Studies on Bicycle Flow Dynamics of Cyclist Loading and Unloading Processes at Bottlenecks**

**Dr. WONG Wai**

Department of Civil and Natural Resources Engineering, University of Canterbury

Date: January 4, 2024 (Thursday)

Time: 4:00 p.m. – 5:00 p.m.

Venue: Room 632C, 6/F Haking Wong Building, The University of Hong Kong

### **Abstract**

Cycling has emerged as one of the most important green transport modes in recent years, with cities increasingly prioritizing cycling in their sustainable policy agenda. However, the associated traffic dynamics, especially the evolution of bicycle flow at bottlenecks, have not been extensively studied. In this study, real-world experiments were conducted to investigate the dynamics of bicycle flow at bottlenecks under varying cycling demands generated by the cyclist unloading and loading processes. Upon the activation of the bottleneck, its capacity remained largely constant. For the same physical system, the bottleneck capacity of the cyclist loading process exceeded that of the unloading process, indicating the occurrence of capacity drop and hysteresis. Statistical analyses demonstrated that the capacity drop was attributable to the difference in speeds of the two processes for the same cycling demands after the bottleneck activation. These findings could potentially be explained by behavioral inertia. Further analysis revealed that compared with the unloading process, the cyclist loading process was associated with higher cycling speeds owing to the higher overtaking rates. The outcomes of this study can advance our understanding of the physics of bicycle flow dynamics and provide valuable insights for transport planning professionals involved in the facility planning and control of existing networks.

### **About the Speaker**

Dr. Wai Wong is a lecturer in the Department of Civil and Natural Resources Engineering at the University of Canterbury, New Zealand. He earned his Ph.D. in transportation and traffic engineering and his bachelor's degree with first-class honours in Civil Engineering both from the Department of Civil Engineering at The University of Hong Kong. Following his graduation, Dr. Wong served as a postdoctoral research fellow at the Department of Civil and Environmental Engineering at the University of Michigan, USA. His research interests include smart city development, big data analytics, intelligent transport systems, cybersecurity and sustainable transport. Fueled by his passion and vision for creating smarter and more efficient transportation systems, Wai has dedicated his research to advancing smart cities through cutting-edge research. He has published in top-tier international journals, including Transportation Science, Transportation Research Part B, Transportation Research Part C, and IEEE Transactions on Intelligent Transportation Systems. He also contributes as a reviewer for these prestigious transportation journals.

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