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| Full Name<br>(中文 / English): | Zhuang Xie |  |
| Affiliated Institution and Title<br>(English): | National University of Defense Technology, China<br>Doctor | |

Biography:

Zhuang Xie received the B.S. degree in Electronic Information Engineering from the Harbin Institute of Technology, Harbin, China, in 2018, and the M.S. and Ph.D. degrees in Information and Communication Engineering from the National University of Defense Technology, Changsha, China, in 2020 and 2024, respectively. He is currently a Lecturer with the College of Electronic Science and Technology, National University of Defense Technology. His research interests include radar signal processing and optimization theory, with emphasis on radar waveform design.

Speech Title:
Robust Radar Sensing Waveform Design Under Target Interpulse Fluctuation

Speech Abstract:
Waveform design plays a crucial role in enhancing detection performance. In this talk, I will share our recent efforts on designing robust radar waveforms under challenging and uncertain conditions—particularly when the target response is unknown exhibits amplitude fluctuations across pulses. These fluctuations, though often overlooked, introduce subtle distortions that degrade detection performance if not properly accounted for.

We explore this problem by modeling the uncertainty using a structured set and formulating a robust design criterion based on worst-case SINR. To tackle the resulting non-convex optimization problem, we develop two practical algorithms that balance performance and computational efficiency. I will also discuss how the problem becomes even more intricate in clutter-rich environments where echoes depend on the transmitted signal itself. To address this, we propose an advanced optimization method that maintains robustness in the presence of both fluctuation and signal-dependent clutter.

Beyond algorithmic development, this talk will highlight the deeper insight gained from an optimization perspective—namely, the inherent trade-off between robustness to target dynamics and the ability to suppress interference. These findings suggest new directions for adaptive and intelligent waveform design in next-generation sensing systems.