Dr. Mingguang Wang is currently an engineer at the CSSC Systems Engineering Research Institute. He received his Ph.D. degree in underwater acoustic engineering from Harbin Engineering University, in Harbin, China, in 2025. His research interests include underwater acoustic vector-sensor signal processing, array signal processing, direction of arrival (DOA) estimation, sparse reconstruction, maximum likelihood estimation, and coordinate descent methods. He has authored over 4 peer-reviewed journal papers, published in journals such as the IEEE Sensors Journal. His research has been supported by the National Natural Science Foundation of China (NSFC). He has presented at both international and domestic conferences, including the IEEE International Conference on Electronic Information and Communication Technology (ICEICT) and the OES China Ocean Acoustics (COA).

Speech Title: Robust maximum likelihood estimation method for AVS Linear array DOA estimation in non-uniform noise

Abstract: The linear array exhibits considerable spatial extent, and the presence of non-stationary noise leads to varying noise variance across its elements, a phenomenon referred to as non-uniformity. Moreover, reflections caused by the array's working platform, such as baffle scattering interference, introduce coherent signal interference into the signal covariance matrix, resulting in deviations from the original signal covariance model and a reduction in direction-of-arrival (DOA) estimation accuracy. To address these problems, this study introduces a maximum likelihood estimation method to jointly estimate the true value of the DOA parameter and the non-uniform noise variance. Additionally, the coordinate descent method is employed to calculate the linearized likelihood function, ensuring that the problem solved in each iteration remains convex and achieves convergence. In underwater acoustic vector sensor (AVS) array applications, the differing spatial selectivity caused by the pressure channel and the velocity channel directivity introduces the internal non-uniform noise variance, resulting in virtual sources that degrade subspace separation accuracy. To mitigate this issue, this study increases the number of virtual sources in the signal subspace and uses a corresponding coordinate descent method to enhance subspace estimation accuracy. Simulation and experimental results are provided to demonstrate the superiority of the proposed approach.