Title: Generalized Orthogonal Chirp Division Multiplexing Technologies for Underwater Acoustic Communications

Abstract: OCDM (Orthogonal Chirp Division Multiplexing) emerges as a promising modulation technology for underwater acoustic communications. In comparison with mainstream schemes like OFDM (Orthogonal Frequency Division Multiplexing) and OTFS (Orthogonal Time Frequency Space), OCDM-modulated signal symbols exhibit the distinctive feature of full time-frequency spreading. Theoretically, this unique characteristic endows OCDM with superior performance in combating impulsive interference and mitigating time-frequency selective fading of the channel.

In recent years, our research team has carried out a series of studies focusing on OCDM-based key techniques, including channel estimation, Doppler estimation and tracking, as well as the integrated design of communication and sensing. Furthermore, we have attempted to generalize the conventional OCDM framework and proposed the GOCDM (Generalized Orthogonal Chirp Division Multiplexing) scheme. By introducing an additional modulation degree of freedom on the basis of OCDM, GOCDM significantly enhances the adaptability and flexibility in coping with the complex underwater acoustic environment.