



Kathleen E. Wage is a Professor in the Electrical and Computer Engineering Department at George Mason University in Fairfax, VA. She received her B.S. in electrical engineering from the University of Tennessee-Knoxville and her M.S. and Ph.D. degrees in electrical engineering from the Massachusetts Institute of Technology/Woods Hole Oceanographic Institution Joint Program. Prof. Wage's current research applies random matrix theory and universal algorithms to problems in sonar signal processing and underwater acoustic propagation. Previous projects explored the design of sparse arrays for underwater environments and investigated ambient noise in the deep ocean. Much of Prof. Wage's research incorporates real data from ocean experiments. During her career she has spent over 100 days on research ships in the North Pacific and Philippine Sea. Prof. Wage is passionate about teaching and enjoys experimenting with new approaches in the classroom and online through her YouTube channel. In 2022 she received the Rossing Prize in Acoustics Education from the Acoustical Society of America. She previously received the Harriet B. Rigas Award (2016) and Mac E. Van Valkenburg Early Career Teaching Award (2008) from the IEEE Education Society.

Match, Adapt and Equalize: Fundamental Tools for Acoustic Signal Processing

Matched filters are common tools for acoustic analysis. The classic spectrogram is a bank of matched filters where each filter is tuned to a different center frequency. A conventional beamformer is a matched filter designed for a planewave signal arriving from a particular angle. Matched filters are used to detect acoustic modes propagating in a waveguide. Many signal processing algorithms can be viewed as an adaptive equalizer followed by a matched filter. This talk will review essential characteristics of matched filters using examples from spectral analysis and array processing. Several approaches to adaptive equalization and matched filtering will be discussed, including a new universal spectral analyzer. Performance of the adaptive algorithms will be assessed using ocean experimental data. Finally, the talk will provide a brief overview of the relevant literature and recent developments in signal processing performance prediction. The session will also include interactive exercises, so please come prepared to meet your neighbors and work together.