Sonar Sensors, Sources and Spiral Waves

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Abstract: Sonar sensors (hydrophones) and sources (projectors) are typically electroacoustic piezoelectric transducers and take on different forms to meet different needs and specifications for navy sonar. This presentation covers physics based modeling and experimental results on example old and new transducer designs including pressure, pressure-gradient, acoustic motion sensors, directional receivers and new projectors that produce spiral wavefronts that are useful for communication and underwater GPS navigation. The acoustic spiral wave can be produced by the superposition of orthogonal dipoles driven in quadrature. Work supported in part by ONR and BTech Acoustics LLC.

Short Bio: Prof. David Brown received his MS and PhD in Engineering Acoustics from the Physics Department at the US Naval Postgraduate School (NPS) in Monterey CA (1989 and 1991) and continued at NPS as a Research Professor of Physics through 1993. His work was on fiber optic interferometric methods for acoustic sensing. Subsequently, he was a visiting professor/Post-Doc at Brown University in Providence and visiting scientist at Naval Underwater Warfare Center in New London, CT working on optical fiber Bragg diffraction gratings and hull array sensor. He joined the Faculty at University of Massachusetts Dartmouth in Electrical Engineering and Adjunct in Physics since 1995 though present where he teaches electroacoustics, fundamentals of acoustics, medical ultrasonics, sonar and underwater acoustics. He is also the principal scientist and founder of BTech Acoustics LLC, a sonar transducer development and manufacturing company in Massachusetts and Rhode Island. Dr. Brown is a Fellow of the Acoustical Society of America (ASA), president of the local Narragansett Chapter (ASA), and former Assoc. Editor for Transduction and Instrumentation for the Journal of ASA.