

MASTER OF SCIENCE IN ENGINEERING ACOUSTICS

ACOUSTIC LOCALIZATION OF TRANSIENT CAVITATION EVENTS WITHIN THE VOLUME OF A SUBMARINE PROPULSOR USING A CROSSED-LINE ARRAY

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The development of a computer program that is capable of localizing transient cavitation events within a scale-model submarine propulsor, for the Naval Surface Warfare Center Acoustic Research Detachment, is presented. The program focuses a 21-element, crossed-line array, by applying exact phase weights in the frequency domain and evaluating the resultant coherence across all of the sensors in the time domain. Localization is determined by a comparison of normalized coherent summations from many different points within a volume enclosing the source.

The program is general, in that the method used is capable of conducting near-field localization using any array, provided the sensor locations are well-known. The source is assumed to be a spherical spreading source with a direct path to the array. A method of rejecting portions of the time series that are contaminated by reflected paths is incorporated. An evaluation of the method using synthetic data is included.

DoD KEY TECHNOLOGY AREAS: Computing and Software, Surface/Under Surface Vehicles - Ships and Watercraft, Other (Submarine Stealth)

KEYWORDS: Acoustic Localization, Array Focusing, Submarine Transient Cavitation, Transient Localization

