

Non-Confidential Description - PSU No. 1964 "Modified Cymbal Transducers"

Keywords:

Cymbal transducers, acoustic imaging, underwater imaging, off-shore oil

Links:

[Inventor website](#)

[U.S. Patent #6,232,702](#)

Inventors:

Robert E. Newnham, Jindong Zhang

Background

The standard "Cymbal" (U.S. Patent No. 5,729,077) is intended for shallow water use (no deeper than 200m water) due to its convex structure and thin caps. If the hydrostatic pressure exceeds a certain threshold, the metal caps deform permanently and the cavity collapses, thus destroying the amplification effect. A modification of the Cymbal transducer was developed to improve pressure tolerance. In this new design, the pressure tolerance of the Cymbal transducers is greatly improved. Another advantage is that any out-of-phase component of the radiating field has been eliminated.

Invention Description

The modified Cymbal transducers demonstrate a much improved pressure tolerance over standard Cymbals and can go much deeper underwater, extending the range of operation for the Cymbal transducers. The simple fabrication process makes it easy to mass-produce these transducers which will greatly reduce its cost. The thin profile, light weight and low cost makes it possible to assemble a very large array of Cymbals, either in a planar or conformal array. It is expected by the inventors that the array can be further optimized to work as well as a standard Tonpiliz array when a high source level is required. The modified Cymbal array can also be used as a receiver for acoustic imaging. The most useful frequency range for underwater imaging appears to be the 5-50 kHz band where the modified Cymbal transducer excels. When fully optimized, an array of Cymbal hydrophones may serve as a multi-element receiver capable of functioning as an acoustic camera. Phased arrays of a thousand or more hydrophones are feasible using these small low-cost, mass-produced components with high hydrostatic piezoelectric coefficients. The improved pressure performance allows the modified Cymbal transducer array to work both in shallow water and in deep submergence. Specifically, the modified Cymbal transducer array may be useful as bottom arrays for long term monitoring of oil movements from off-shore oil wells.

Advantages/Applications

- Greatly improved pressure tolerance compared to current solutions; useful in both shallow and deep water
- Eliminates any out-of-phase component of the radiating field
- Thin profile, low cost, and light weight optimal for Cymbal arrays

Contact: Matthew D. Smith
Sr. Technology Licensing Officer
The Pennsylvania State University

Phone: (814) 863-1122
Fax: (814) 865-3591
E-mail: mds126@psu.edu

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