

Energy harvesting with piezoelectric ceramics

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Cymbal transducers are small, thin Class V flextensional transducers. A single cymbal element consists of a piezoelectric disk sandwiched between two metal cymbal-shaped endcaps which serve as mechanical transformers, converting the low impedance, small extensional motion of the ceramic into high impedance, large flextensional motion of the endcap. This work represents an overview of cymbal transducer and its applications. Cymbal uses not only d_{33} coefficient but also d_{31} . Cymbal with its unique design is a versatile transducer for various application areas. It can be used as single hydrophone or an array unit for underwater transducer applications. It is still one of the best hydrophone for the shallow water applications with its high figure of merit. Cymbal shows very high displacement under applied electrical field. On the cymbal structure ceramic works under compressive stress which gives it high reliability compared to the other composite structures. Cymbal has also potential for the energy harvesting applications, because of its very high piezoelectric charge coefficient. It is possible to manufacture cymbal transducer in mm to couple cm diameter depending on the application area. Extensive parametric studies were performed using FEA to investigate the size and material effects on cymbal transducer characteristics.

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