

新型三维MEMS矢量水听器的设计

作者: 李振, 张国军, 薛晨阳

单位: 山西太原中北大学

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摘要:

根据国内对高灵敏度、低频小体积三维矢量水听器的需求,提出了一种仿鱼侧线纤毛的MEMS三维矢量水听器。该水听器采用多纤毛结构分别用来接收X、Y与Z方向的声信息,采用ANSYS进行仿真,静力分析得出了布放压阻的合理位置;谐响应分析得出该结构的固有频率在1.5KHz左右;驻波桶校准测试结果表明:该水听器的灵敏度范围在-200dB到-180dB左右;在25Hz-2000Hz频段内具有良好的频响特性;指向性分辨率大于等于30dB,具有良好的“8”字形指向性。

关键词: 矢量水听器; MEMS; ANSYS; 仿生

Design of A New Three-Dimensional Vector Hydrophone

Author's Name:

Institution:

Abstract:

According to the requirements of high sensitivity, low frequency and small volume three-dimensional vector hydrophone, a new kind of three-dimensional MEMS vector hydrophone imitated fish's lateral line sense organ is proposed in this paper. Multiple cilia structure of the hydrophone is used to receive the acoustic information of X, Y and Z directions. The piezoresistive reasonable position is obtained through finite element analysis by ANSYS, and the resonance frequency is 1.5 KHz. A standing wave barrel test results show that: the sensitivity range of the hydrophone can be from -200dB to about -180dB; and it has a good frequency response characteristics in 25Hz-2000Hz band; directivity tests display that the hydrophone has a good "8"-shaped directivity, and the directivity resolution is not less than 30dB.

Keywords: vector hydrophone; MEMS; ANSYS; bionic

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