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**Inverse problems in sound radiation of complex structures from
measurements in a large acoustic tank**

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The Laboratory for Structural Acoustics (LSA) at NRL consists of an indoor cylindrical tank (17 m dia. by 15 m deep) filled with ~ 1 million gallons of deionized water. Key features include: 1) vibration isolation, 2) active temperature control, and 3) anechoic materials. This unique laboratory is instrumented with sophisticated mechanical, electronic and optical systems, that include large workspace in-water robotic scanners to generate nearfield acoustical holography (NAH) databases. We discuss such a database consisting of the underwater near-field pressure measured on a two-dimensional surface conformal to an internally driven complex structure floating at the air-water interface. Various inverse approaches are discussed to image the normal velocity and intensity of the structure at its interface to the fluid, as well as the total power radiated, revealing mechanisms of radiation related to the internal structure. These inverse approaches consist of the equivalent source method compared with the well established Fourier acoustics methods of NAH. This work was supported by the US Office of Naval Research.