

ACOUSTICS2008/811
Vector intensity reconstructions in a volume surrounding a rigid spherical measurement array

Earl Williams^a and Kazuhiro Takashima^b

^aNaval Research Laboratory, 4555 Overlook Ave, Washington, DC 20375, USA

^bNittobo Acoustic Engineering Co., Ltd., 1-21-10, Midori, Sumida-Ku, 130-0021 Tokyo, Japan

An approach is presented that provides a prediction of the vector intensity field throughout a volume exterior to a rigid spherical measurement array consisting of 31 flush mounted microphones. The theory is based on spherical harmonic expansions of the measured field with the radial variation of the near-field pressure obtained using the Greens function with vanishing normal derivative at the rigid sphere surface. Experimental results with rigid spherical arrays of differing radii are presented using multiple incoherent sources. Successful intensity reconstructions are obtained over a volume three times the sphere radius up to a frequency of 1.5 kHz that clearly reveal the locations and levels of the two sources. This volumetric intensity probe is very similar mathematically to one described recently by the author (EGW) that used 50 microphones in an open array. The latter was used successfully inside an aircraft cabin in flight to uncover sources of noise. This work was supported by the US Office of Naval Research and Nittobo Acoustic Engineering Co. Ltd.