

4pMU1. Tone hole radiation directivity measurements. Gary P. Scavone (CCRMA, Dept. of Music, Stanford Univ., Stanford, CA 94305) and Matti Karjalainen (Lab. of Acoust. and Audio Signal Processing, Helsinki Univ. of Technology, FIN-02015 HUT, Finland)

Measurements have been conducted in an anechoic chamber for a comparison to current acoustic theory with regard to radiation directivity from a cylindrical pipe with toneholes. Several difficulties arise in measurements of this sort, including (1) the generation of sufficient driving signal strength at the pipe input for pickup by an external microphone; (2) external source-to-pickup isolation; (3) measurement contamination due to nonlinear driver distortion. Time-delay spectrometry using an exponentially swept sine signal was employed to determine impulse responses at points external to the experimental air column. This technique is effective in clearly isolating nonlinear artifacts from the desired linear system response along the time axis, thus allowing the use of a strong driving signal without fear of nonlinear distortion. The experimental air column was positioned through a wall conduit into the anechoic chamber such that the driver and pipe input were located outside the chamber while the open pipe end and tone holes were inside the chamber, effectively isolating the source from the pickup. Measured results are compared to both transmission-line, frequency-domain simulations, as well as time-domain digital waveguide calculations.