Virtual Education Lab: Comparison of experimental specular reflections with VIRGO

In the last post, we presented an experimental measurement of the scattering from a 12” wide flat panel, using the 2D boundary plane Goniometer. Before we move on to provide examples of the onset frequency for specularity for different ratios of panel width to incident wavelength, I thought it would be interesting to compare experimental polar responses with those from VIRGO at both normal and 45° incident angles. For review, Figure 1 shows the experimental polar responses at octave band center frequencies from 500 Hz to 16 kHz, with the associated ratio of the panel width to the incident wavelength.

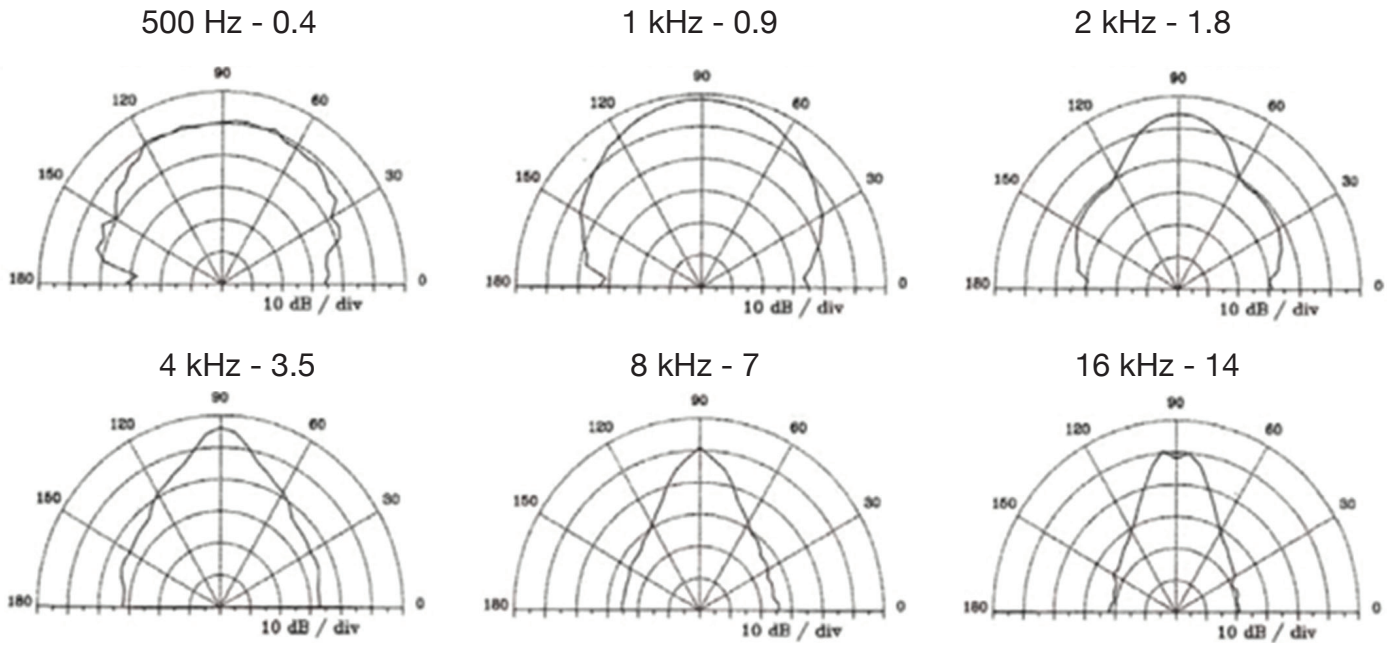

Figure 1. Polar responses for normal incidence at 6 octave band center frequencies with the respective values of the width of the panel divided by the incident wavelength.

As we have mentioned, the 2D experimental Goniometer uses 37 microphones with a 5° angular spacing and 5 source locations. For greater resolution, the VIRGO simulations use 180 microphones with a 1° angular spacing. With the use of DASK parallel distributed cloud cluster computing, these VIRGO simulations can be determined up to 16 kHz, a frequency typically not achievable with BEM desktop predictions. The higher simulated resolution is clearly evident, further illustrating how the scattered energy is increasingly directed specularly as the ratio of panel width to incident wavelength increases. This demonstrates that we can safely state that a ratio of 8 is sufficient to confirm specularity.

In Figure 3, we illustrate the scattered polar responses for an angle of incidence of 45°. The specular scattering at -45° is clearly evident.

In the next post, we discuss the onset frequency of speculat reflections from various surfaces and objects.

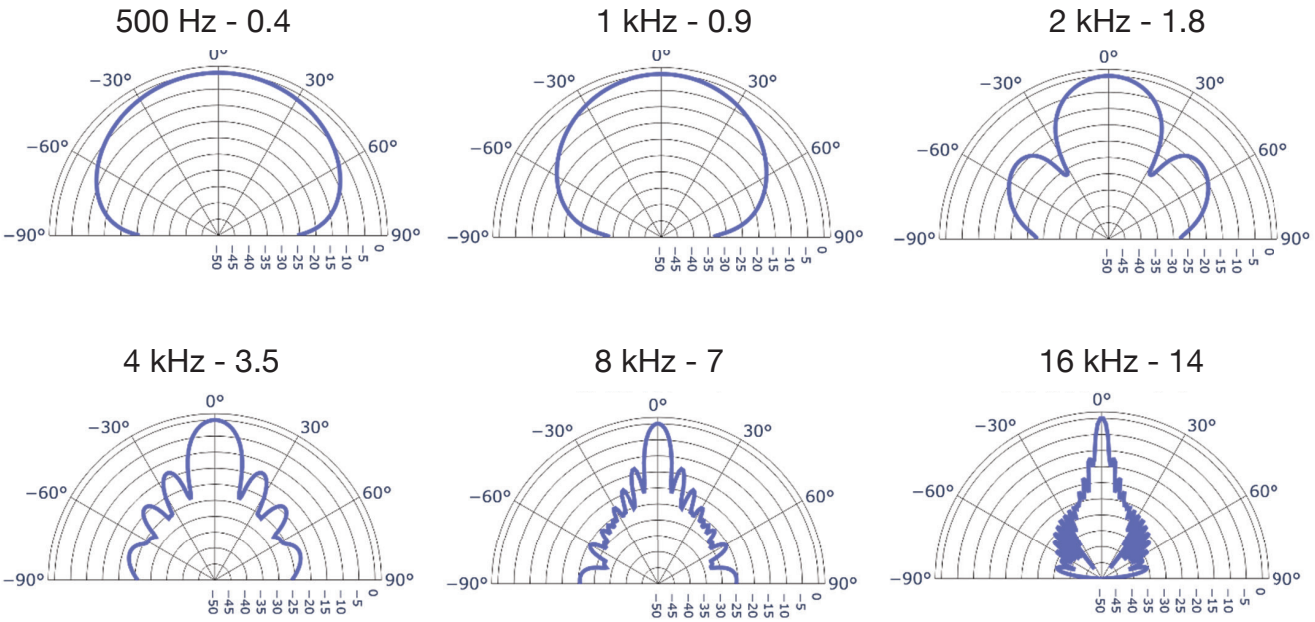

Figure 2. VIRGO simulated polar responses for normal incidence at 6 octave band center frequencies with the respective values of the width of the panel divided by the incident wavelength.

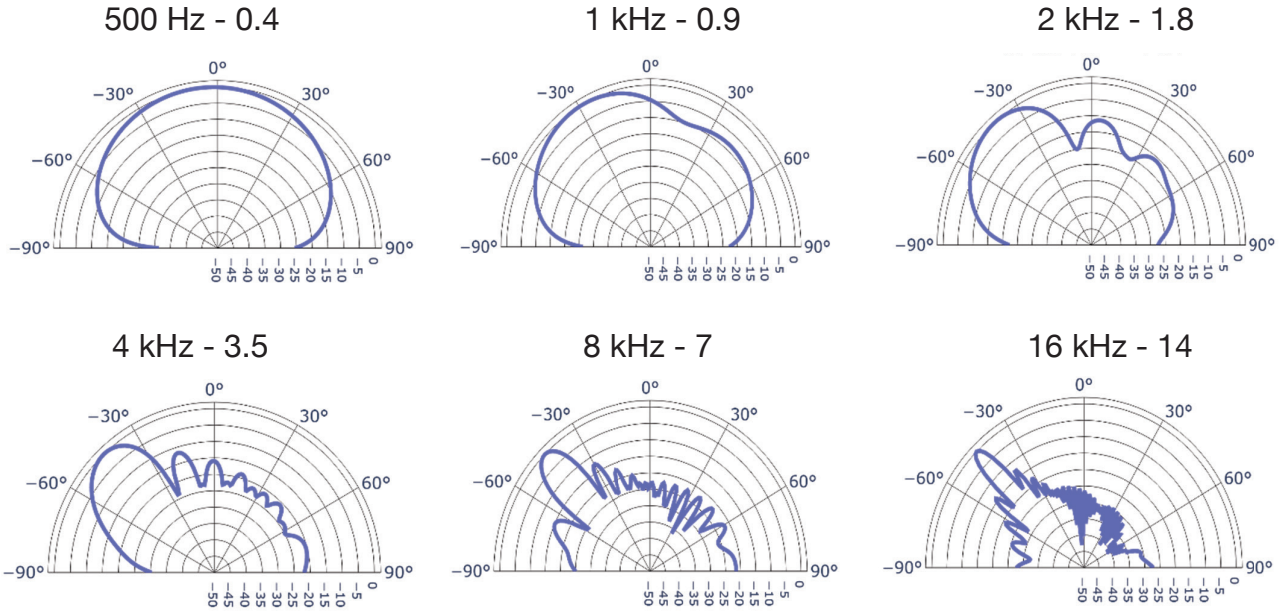

Figure 3. VIRGO simulated polar responses for 45° incidence at 6 octave band center frequencies with the respective values of the width of the panel divided by the incident wavelength.

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