CJS Labs

Technology · Research · Strategy · Solutions

Lab Notes

Electroacoustics & Audio

- *Consulting*
- *Design / Testing*
- *Training*

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Inside this issue:

ASA Fellowship Award	1
Streamed Sessions from the ASA 175th Meeting in Minneapolis	1
ASA Standards Manager Position	1
Custom In-House Training Services	1
Microphone Proximity Effect as a function of Type and Distance & Noise Cancelling S/N	2

Training Services

CJS Labs offers customized in-house training. Our design experience, proven processes, and measurement expertise will make your product development more efficient. Learn how to optimize both your designs and test routines. Having a thorough understanding of fundamentals, correct terminology, and proper techniques will also enable you to make more informed decisions and communicate more effectively with your customers and vendors as well as within your own organization. Understand why certain failure modes are problematic, even if they are not obvious or audible. Sample course outlines and details are available on our website:

http://www.cjs-labs.com/training_seminars.html

Contact us to schedule a training course for your organization.

Christopher Struck Receives the ASA Fellowship Award

On May 9th, 2018, at the Acoustical Society of America 175th Meeting in Minneapolis, I was honored to be presented with the ASA Fellowship Award. The accompanying citation read: "For contributions to acoustical standards development and instrument design." Since standards work is necessarily a collaborative effort, I wish to thank the members of ASACOS as well as everyone participating in the ASA Standards Program.

Christopher Struck receiving the Fellowship Award from ASA President Marcia Isakson at the Minnesota meeting.

News and Upcoming Events

ASA 175th Meeting in Minneapolis podcasts of streamed sessions

Many of the sessions at the recent Acoustical Society of America meeting in were live streamed and recorded. The session I chaired on Thursday, 10 May (4aID) entitled "***Acoustical Standards In Action: Realization, Application, and Evolution***", was recorded, including *"An overview of the Standards Program of the Acoustical Society of America"*. Please visit the

ASA streaming webpage

JOB OPENING: ASA Standards Manager

The Acoustical Society of America seeks qualified candidates for the position of Standards Manager to run the operational activities of the ASA Standards Office.

Details are available at:

https://acousticalsociety.org/standards-manager/

Please contact us to discuss your projects and let us know how we can be of service to you.

Christopher J. Struck

CEO & Chief Scientist

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NCAC National Council of Acoustical Consultants Member

IEEE CNSV

CJS Labs is a consulting firm based in San Francisco, CA. We specialize in audio and electroacoustics applications. With over 30 years of industry experience in engineering and technology management, our areas of expertise include transducers, acoustics, system design, instrumentation, measurement and analysis techniques, hearing science, speech intelligibility, telephonometry, and perceptual coding. We also offer project management, technology strategy, patent & IP evaluation, and training services

Back issues of Lab Notes are available on our website at:
http://www.cjs-labs.com/lab_notes_links.html

Microphone Proximity Effect as a function of Type and Distance & Noise Cancelling S/N

The 'Proximity Effect' manifests itself as a boost in the low frequency response of a directional microphone for sources close to the microphone. The polar equation of a first-order directional microphone is:

$$\rho = \alpha + \beta \cos \theta$$

with $$\alpha + \beta = 1$$

where α is the omnidirectional component, β is the dipole or bidirectional component, and θ is the angle of sound incidence. The omnidirectional element senses sound pressure equally from all directions while the dipole element senses pressure gradient and is therefore directionally dependent. Thus, all first order directional patterns can be created by a scaled sum of omnidirectional and dipole elements.

	α	β
Bidirectional	0.000	1.000
Hypercardioid	0.250	0.750
Supercardioid	0.366	0.634
Cardioid	0.500	0.500
Sub-cardioid	0.700	0.300
Omnidirectional	1.000	0.000

For sound sources in the far field, the driving force on the dipole is proportional to frequency. However, for sound sources close to the microphone, there is an added inverse square pressure difference which is constant with frequency that adds to the frequency-dependent pressure gradient. The inverse square component dominates at low frequencies and causes a rise in the output of the dipole element for decreasing frequencies. Figs. 1 and 2 show the on-axis response at several source distances for a bidirectional ('Figure of 8') and a cardioid microphone, respectively. The effect is primarily at low frequencies.

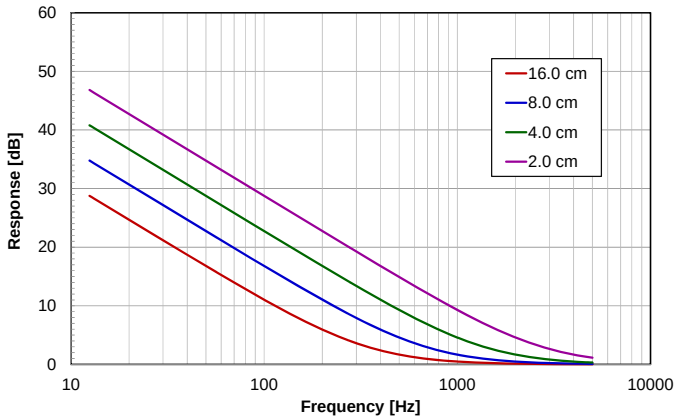

Fig. 1. Proximity effect—Bidirectional mic.

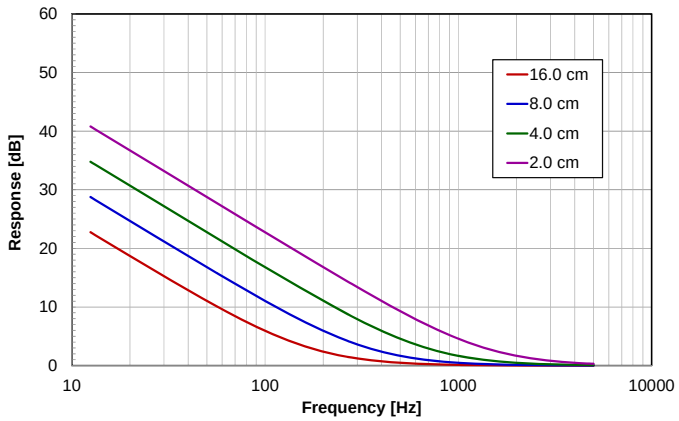

Fig. 2. Proximity effect—Cardioid mic.

This effect is leveraged in close-talking noise cancelling headsets. In fact, the signal-to-noise ratio improvement (close talking voice vs. far field noise) for a noise cancelling microphone is the same as the proximity effect plotted here.

Please contact us for more information.