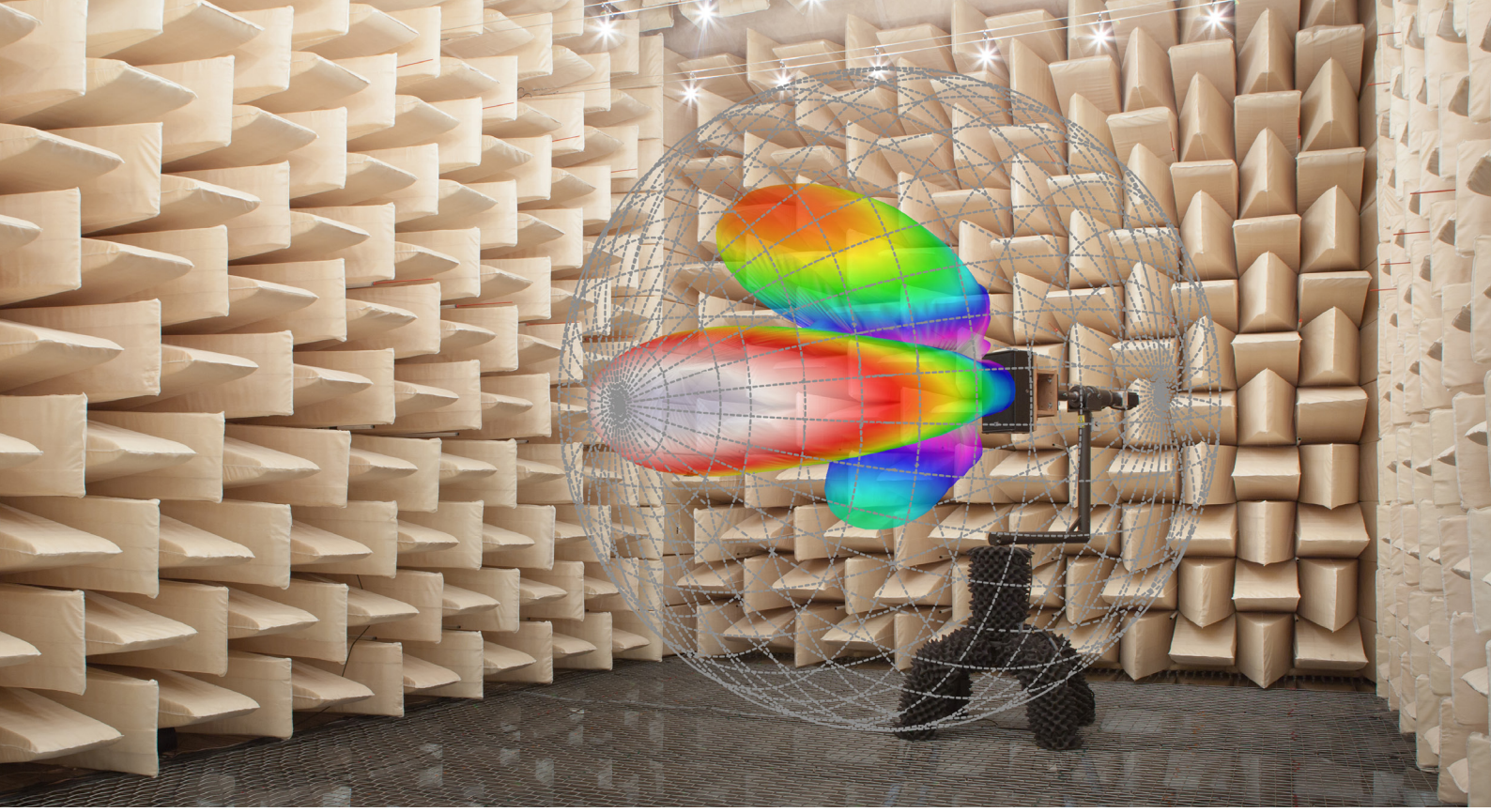


Fraunhofer IDMT

Measurement of Loudspeaker Systems and Components

The proposed services include standardized test methods as well as specialized and custom designed procedures. For these, we offer highly sophisticated laboratories and test facilities.

Measured parameters

Acoustical: Sound pressure level, frequency response, phase response, group delay, step response, impulse response, waterfall diagram, harmonic distortion, intermodulation distortion, maximum SPL at predefined THD, radiation pattern (isobar, polar, balloon plot)

Electrical: Electrical impedance, Thiele&Small respectively Klippel parameters (LPM/LSI), transmission behavior of loudspeaker controller (frequency response, THD, inherent noise, etc.)

Optical: Vibration displacement, velocity and acceleration of surfaces like membranes or enclosure walls

Measurement objects

Loudspeaker chassis (from micro speakers to public address woofers), loudspeaker systems, loudspeaker cabinets, loudspeaker arrays, headphones, alarms, loudspeaker electronics, transducer systems, vibrating surfaces

Measurement equipment

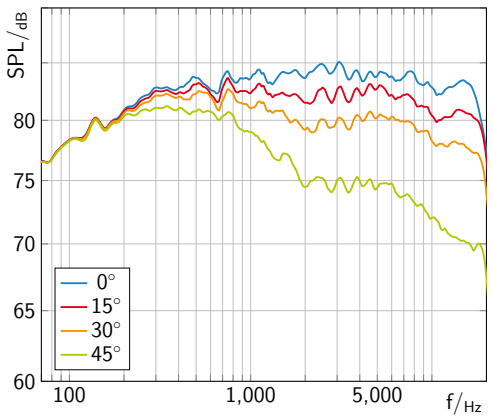
Anechoic chamber, measurement system Monkey Forest with robot ELF, Klippel R&D System with Scanning Laser, Polytec PSV 400 Laser Scanning Vibrometer, Soundbook with SAMURAI software from Sinus Messtechnik, measurement system MLSSA, measurement system EASERA, Rohde & Schwarz Audio Analyzer UPL and UPD, Cortex MK2 artificial head, Bruel & Kjear turntable system, cableway for measurement microphones from Norsonic, standard baffle (DIN 45575), measurement microphones from MT Gefell and structure-borne sound sensors from Metra

Acoustic Measurements in the anechoic chamber

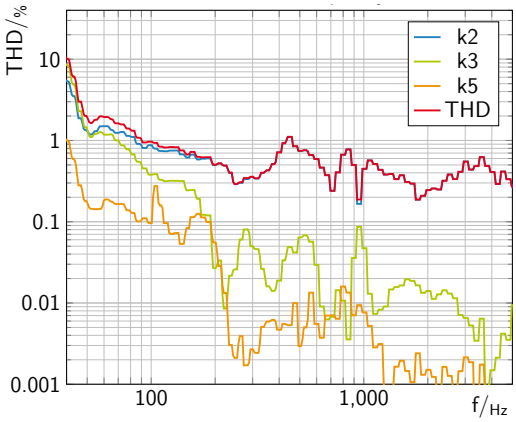
Left: example of radiation pattern at 0°, 15°, 30° and 45° in the horiz. plane.

Right: example of harmonic distortion (THD, k2, k3, k5) at constant input voltage over frequency.

Amplitude frequency response

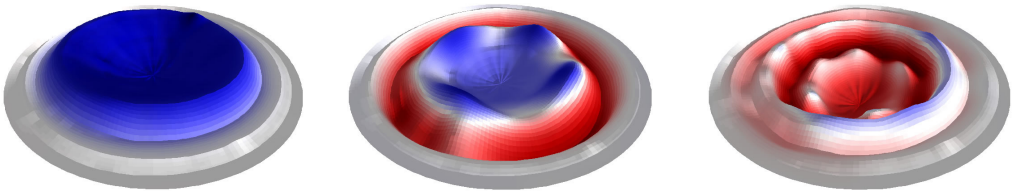


Harmonic distortion over frequency



Vibrational behavior of a loudspeaker

Example of mode shapes of a loudspeaker membrane at different frequencies (left: 400 Hz, middle: 2.9 kHz, right: 7.8 kHz) with increasing partial vibration.

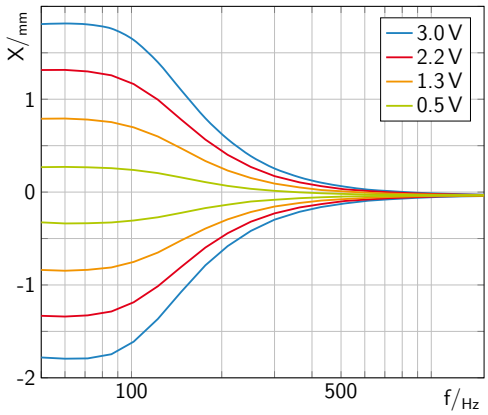


Measurement of an electrodynamic loudspeaker driver

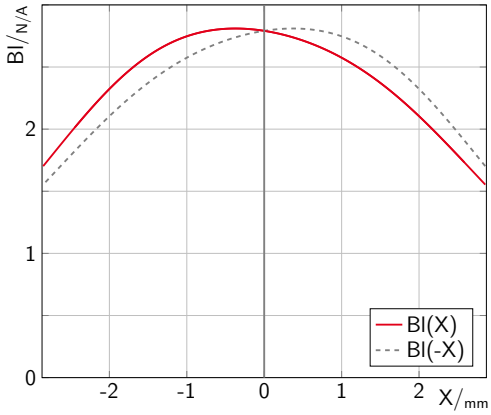
Left: example of membrane respectively voice coil excursion at different input voltages

Right: example of force factor as a function of membrane respectively voice coil excursion.

Membrane excursion over frequency



Force factor over membrane excursion



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