

gampt **ULTRASOUND ● SCHOOL**

10. Workshop „Innovative Lehrmittel für das Erlernen physikalischer Konzepte“

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GAMPT – GESELLSCHAFT FÜR ANGEWANDTE MEDIZINISCHE PHYSIK UND TECHNIK

1998 Firmengründung

2003 Zappendorf

seit 2010 in Merseburg bei Halle



Ausbildung

- Equipment für die Ausbildung an Fach- und Hochschulen



Medizin

- Messung von Mikroblasen (BubbleCounter)
- THED - Time Harmonic Elastography (Kooperation mit Charité Berlin)



Industrie

- Messungen dünner Schichten
- Ultraschallsonden nach Kundenspezifikation
- F&E - Entwicklung von Sensoren und Messtechnik

GAMPT – Ultraschall in der Ausbildung



⇒ Didaktische Vorteile:

- **Leichtes Verständnis** durch einfache und anschauliche Objekte
- **Hohe Motivation** der Schüler und Studenten durch selbstständiges Arbeiten und Experimentieren
- **Strukturiertes Lernen** durch schrittweises Vorgehen im Experiment

A photograph of children in a classroom. In the foreground, a child is holding a small black object, possibly a sensor or probe, connected to a white ultrasound machine on a table. Another child is visible in the background, looking towards the machine. The scene is brightly lit, and the children appear to be engaged in a hands-on learning activity.

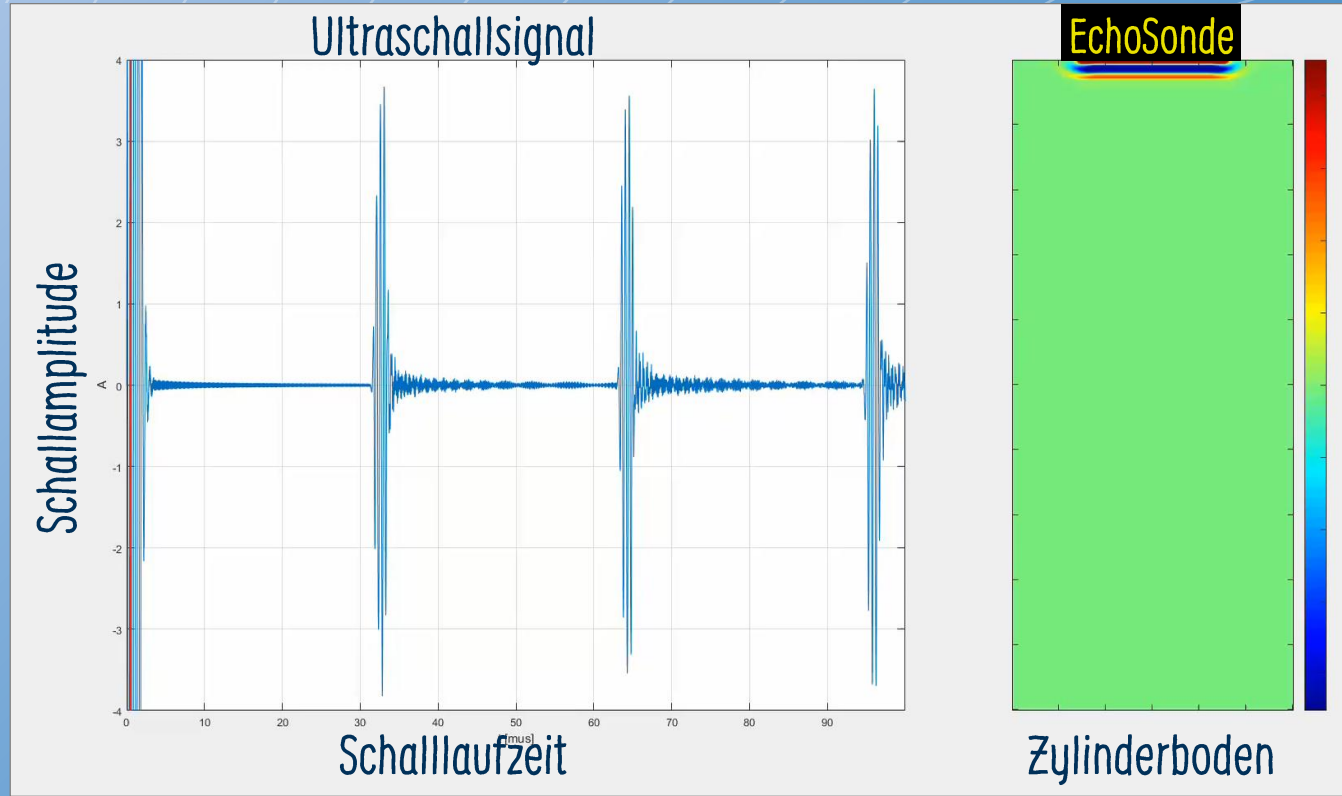
ULTRASOUND 4 SCHOOL

Ultraschall begreifen mit dem

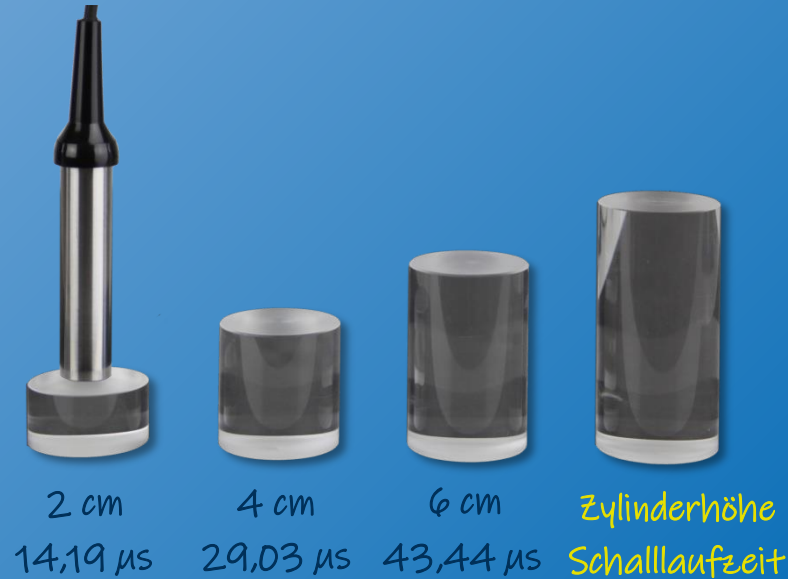
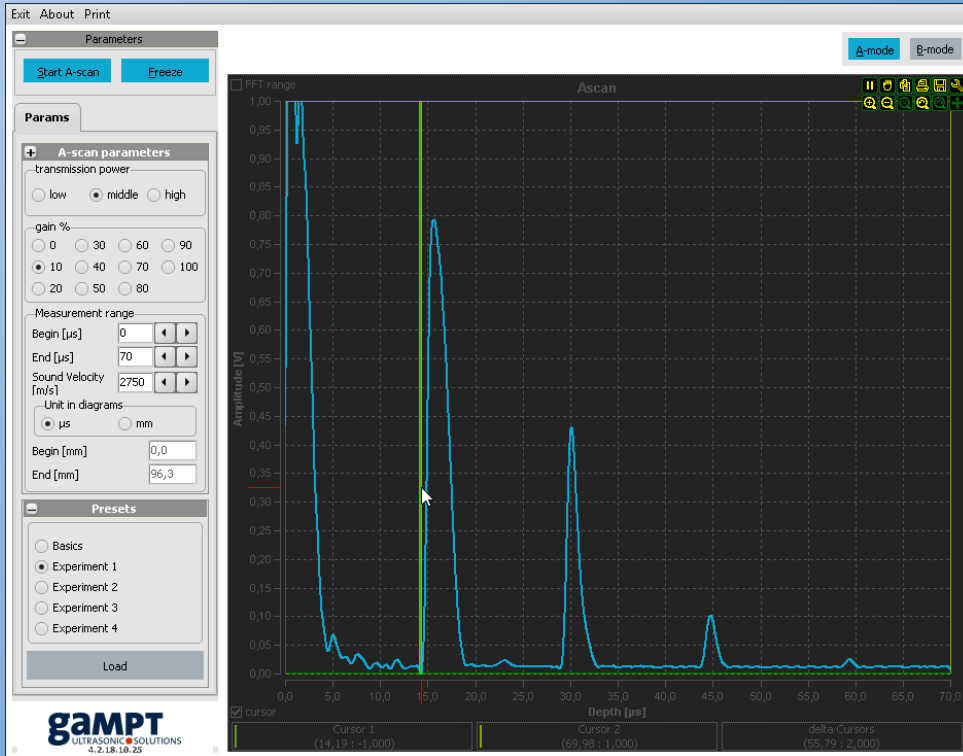
EchoSet



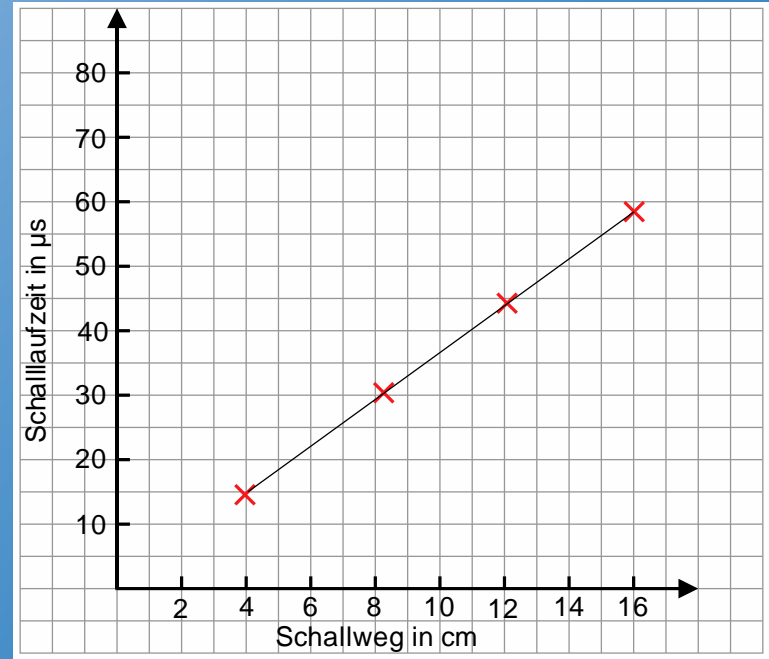
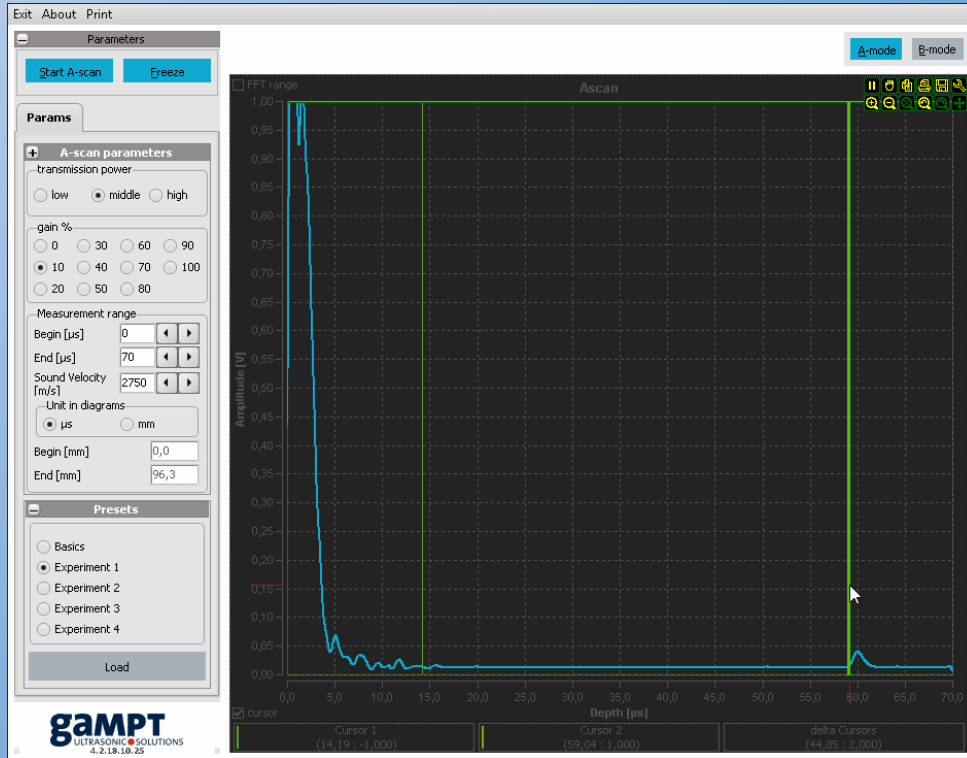
Simulation der Fortpflanzung eines Ultraschall-Impulses in einem Zylinder



EchoSet Experiment 1 – Schallausbreitung im Festkörper

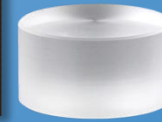
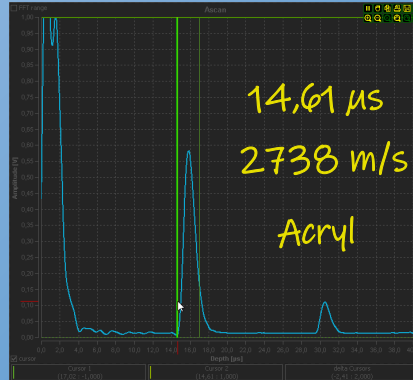
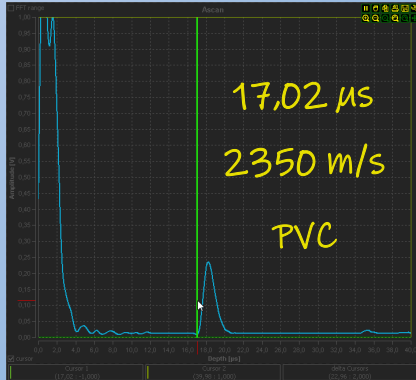


EchoSet Experiment 1 – Schallausbreitung im Festkörper



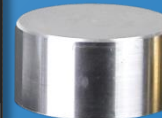
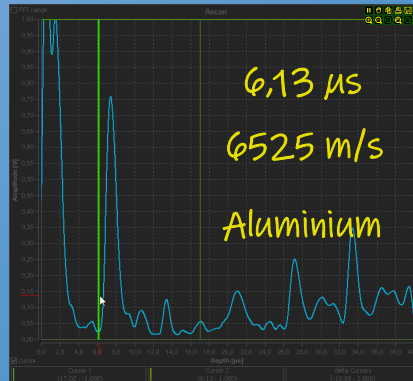
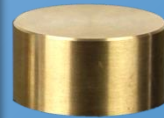
Schalllaufzeit ~ Schallweg

EchoSet Experiment 2 – Materialabhängige Schallausbreitung



$$c = \frac{2 * h}{t}$$

c - Schallgeschwindigkeit
h - Probenhöhe = 2 cm
t - Schalllaufzeit



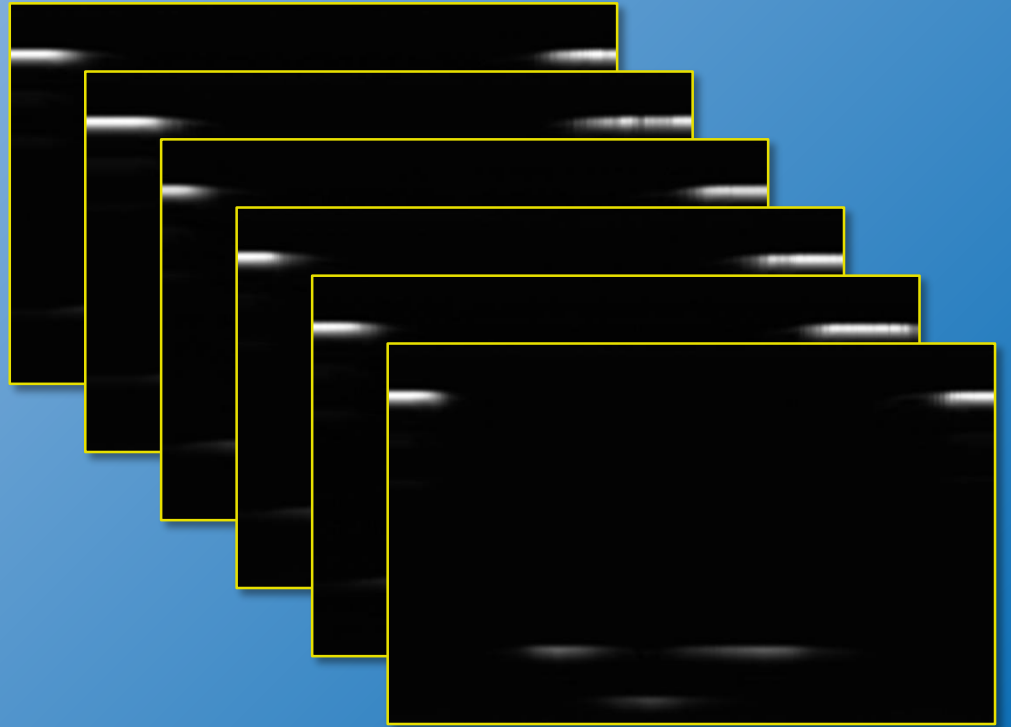
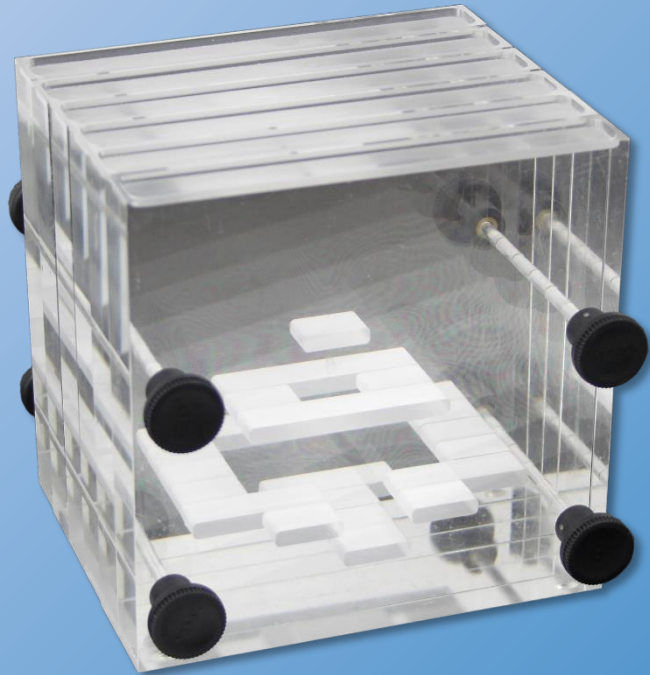
Material	Schallgeschwindigkeit in m/s	Material	Schallgeschwindigkeit in m/s
Aluminium	6350	Messing	4430
Kupfer	4660	Plexiglas	2760
Silber	3600	PVC	2330
Gold	3240	Polyurethan	1780
Blei	2160	Teflon	1400
Luft (20°C)	343	Wasser (20°C)	1484

EchoSet Experiment 3 – Das handgeführte B-Bild

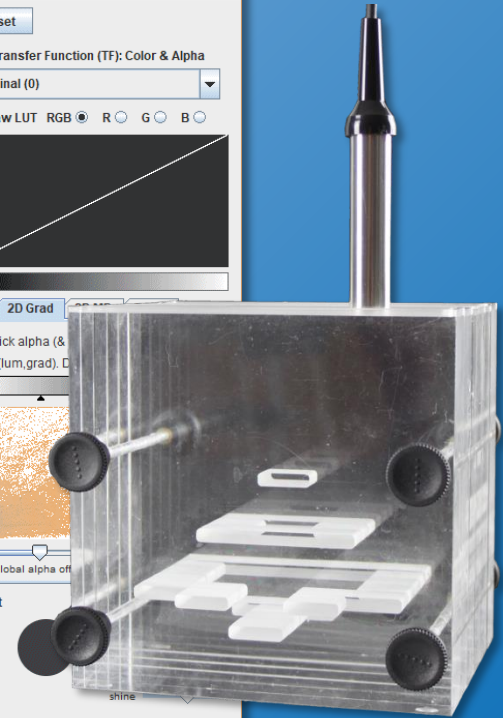
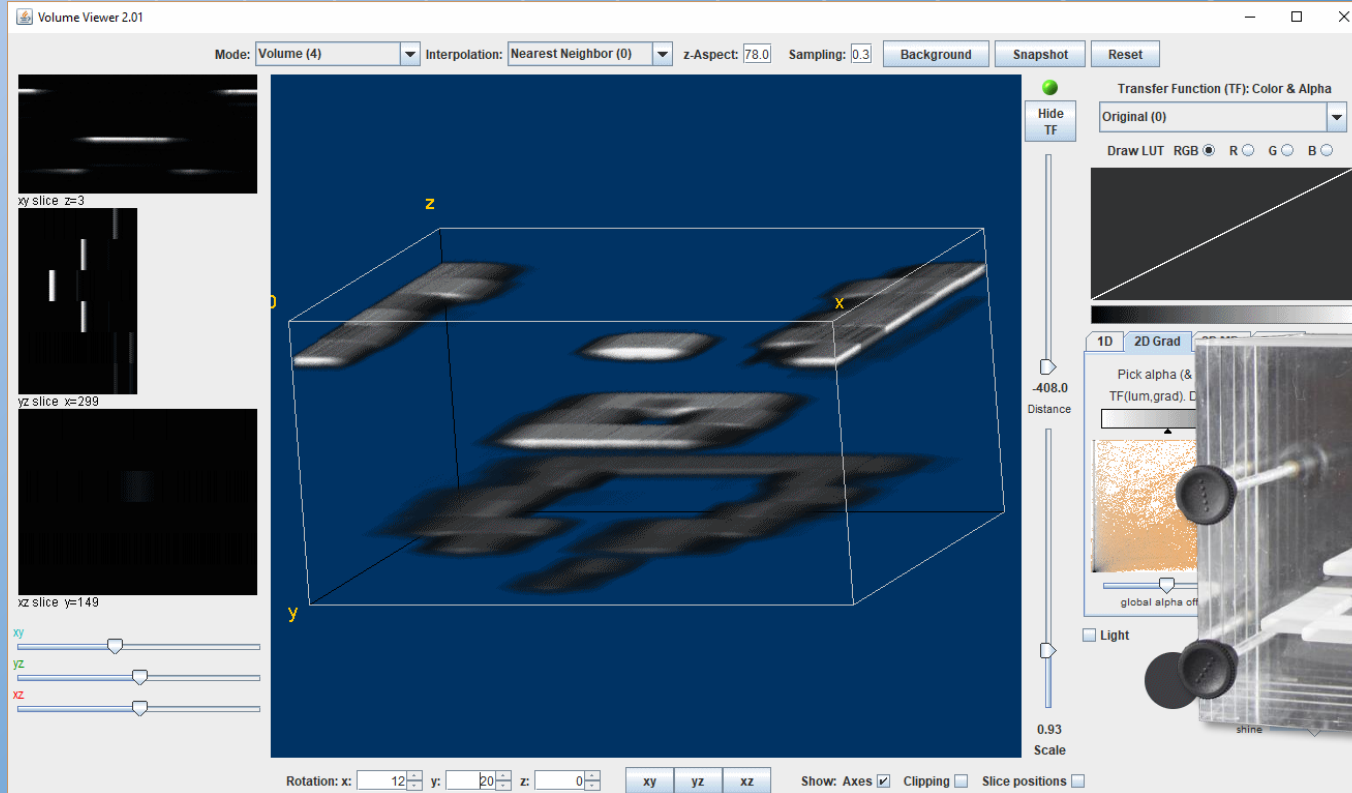
The screenshot displays the EchoSet software interface with the following components:

- Parameters Panel (Left):**
 - Buttons: Start A-scan, Freeze
 - A-scan selection: HF, HF + Amp, Amp (selected)
 - Params, USB, Draw
 - B-mode: Diagram selection (Dia 1, Dia 2, Dia 3), Scan mode (manual, Scanner), Image Levels (Show levels, Gray scale, inverted, Auto min/max), Level max (1,0), Level min (0,0), Image width (20,0), Shot numbers (0 | 365), Measurement time (12,0s), Path length (20,0)
- B-scan (Center):** A 2D image showing depth [µs] on the y-axis (0 to 70) and Time [s] on the x-axis (0 to 11). It displays multiple horizontal bright lines representing reflections from different depths over time.
- A-scan (Right):** A 1D graph showing Depth [µs] on the y-axis (0,0 to 70,0) and Amplitude [V] on the x-axis (0,00 to 0,60). It shows a series of peaks corresponding to the reflections in the B-scan. A yellow arrow points from the probe to this graph.
- Hand and Probe:** A hand is holding an ultrasound probe against a metal block with several holes. The probe is connected to the software.

EchoSet Experiment 4 – 3D-Ultraschall



EchoSet Experiment 4 – 3D-Ultraschall



Ultraschall zum Anfassen
mit dem

ImageSet

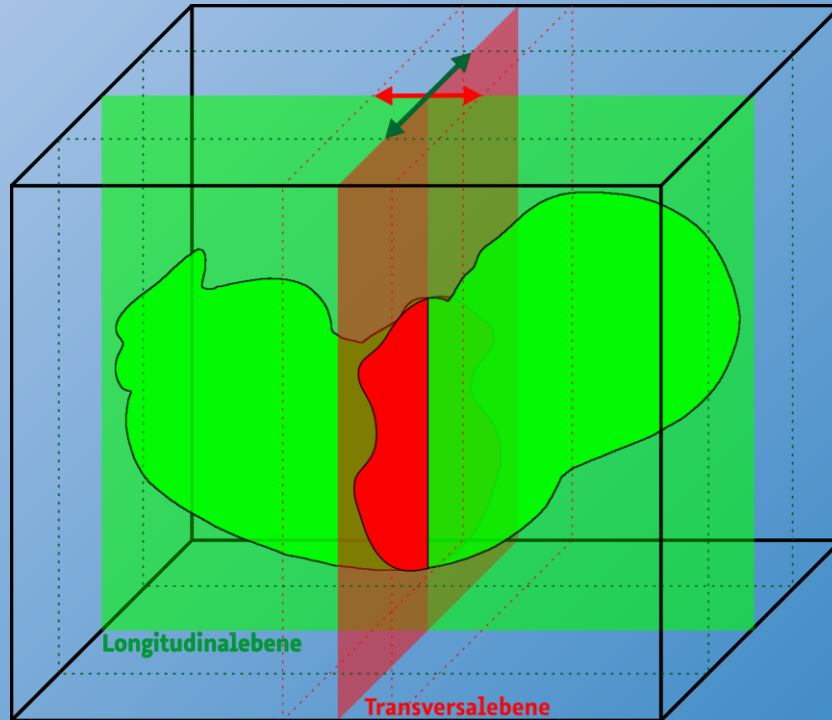


ImageSet Demoversuch – B-Bild mit ImageSonde

The image displays a software interface for an ultrasound system. On the left, a control panel includes a 'Parameter' section with 'Reset' and 'Close' buttons, and 'Get Data' and 'Freeze' buttons. Below this are 'Imaging State' (Online/Offline), 'Scan Mode' (B/B+M), and 'Image/Palette/Cine' options (Main/TGC/M-Line). A checked 'A-Scanline' and 'M-Line Position [22]' are also visible. The main display area is split: the left side shows a B-mode image of a curved array transducer with a green line indicating the scan line; the right side shows an A-scan waveform with a vertical axis from 0.0 to 90.0 mm. To the right of the waveform is an 'Info' panel with 'Probe: CS-2R60S-3', a 'Cursor' section (Line/Ellipse), and 'Lines' and 'Ellipses' lists. A hand is holding a white ultrasound probe over a box labeled 'ImageSet ImagePhantom'.

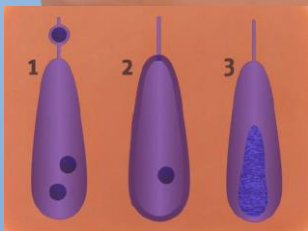
Sonogramm des konvexen Wandler-Arrays aus 64 Elementen

Scannen in Längsrichtung und in Querrichtung



ImageSet Demoversuch – Erweiterungen

The screenshot displays the ImageViewSchool software interface. The main window shows a B-mode ultrasound image of a kidney. A green line is drawn across the image, and two yellow lines are drawn to measure the length of two structures. The software interface includes a parameter panel on the left with buttons for 'Stop' and 'Freeze', and a 'Depth [mm]' scale on the right. The 'Info' panel on the right shows the probe type 'C5-2R60S-3' and the state 'Imaging is frozen ...'. The 'Lines' panel shows two lines with lengths of 8,76 mm and 7,79 mm. The 'gAMPT ULTRASONIC SOLUTIONS 1.0.19.4.2' logo is visible in the bottom right corner of the software window.



ImageSet Demoversuch – Erweiterungen

The image shows a hand holding an ultrasound probe over a pig kidney phantom. The software interface, ImageViewSchool, displays a B-mode image of the kidney. A green vertical line is positioned at the center of the image. Two orange lines are drawn across the image, indicating measurements. The software interface includes a parameter panel on the left, a central image area, a depth scale on the right, and an info panel on the far right.

Parameter Panel:

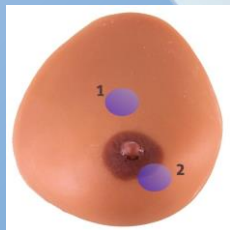
- Exit Print About Reset
- Parameter: Stop Freeze
- TGC A-Line Presets
- Main Image
- Frequency [MHz]: 2.0 3.0 4.0 5.0
- Depth [mm]: 210

Info Panel:

- Info
- Probe: C5-2R60S-3
- Cursor: Line Ellipse
- Lines:
 - 1 Length: 17,13 mm
 - 2 Length: 16,96 mm
 - 3
- Ellipses:
 - 1
 - 2
 - 3
- Clear Cursors
- State: Imaging is frozen ...
- gAMPT ULTRASONIC SOLUTIONS 1.0.19.4.2

ImageSet Demoversuch – Erweiterungen

The screenshot displays the ImageViewSchool software interface. On the left, a hand holds an ultrasound probe over an orange. The software window shows a B-mode scan of the orange with two yellow lines and orange dots indicating measurements. The parameter panel on the left includes a 'Freeze' button, 'A-Line' and 'Presets' tabs, and a frequency selection of 5.0 MHz. The main scan area shows a curved scan line with two yellow lines and orange dots indicating measurements. The right panel shows a depth scale from 0.0 to 90.0 mm and a green waveform. The info panel on the far right shows 'Probe: C5-2R60S-3', 'Cursor' type set to 'Line', and 'Lines' with lengths: 1 (20,86 mm) and 2 (10,25 mm). The state is 'Imaging is frozen ...'.



Vielen Dank für Ihre Aufmerksamkeit

Besuchen Sie uns an unserem Stand oder unter www.gampt.de

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