USCT system of KIT

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System description
- Semi-ellipsoidal 3D aperture, diameter 26 cm, height 16 cm
- Approx. spherical waves at 2.5 MHz center frequency and bandwidth 1.5 MHz (-6 dB)
- Virtual transducer positions: rotational and translational movements of sensor system (aperture positions)
- 2041 individual transducers: operated as emitters (628) and receivers (1413)
- Transducer opening angle: 38.2° (standard deviation ±1.5°) at -6 dB
- Transducer Array Systems (TAS): 4 emitters and 9 receivers including pre-amplifier and control electronics
- Data acquisition system:
  - FPGA based, stores up to 80 GByte (42 million A-scans)
  - 480 parallel channels (12 Bit at 20 MHz)
  - Data acquisition at one aperture position in approx. ten seconds

KIT data
Specifications
- Sampling rate: 20 MHz at data acquisition, bandpass undersampling to 6.6 MHz for storage, 10 MHz after preprocessing
- Emitted pulse: frequency coded chirp with center frequency 2.5 MHz, bandwidth 1.67 MHz and duration 25.6 µs
- Empty measurement of aperture filled with water is provided for each data set
- Metadata, e.g. temperature trend during data acquisition, transducer coordinates at recorded aperture positions, individual channel gain, etc.

Gelatin phantom:
- Gelatin in conical plastic cup with water filled inclusions
- Diameter ~7 cm (bottom) and ~10 cm (top), height ~10 cm
- Speed of sound of gelatin ~1515 m/s
- Inclusions: during gelatin curing drinking straws with diameter 5 mm were embedded, straws were removed and inclusions were filled with water
- Amount of data: 10 aperture positions x 157x4 emissions x 157x9 receivers

Turkey phantom:
- Two olives without stones wrapped in turkey steak embedded in a gelatin filled condom
- Approx. spherical, diameter ~9 cm
- Speed of sound of turkey steak >1550 m/s, olives ~1450 m/s
- Amount of data: 20 aperture positions x 157x4 emissions x 157x9 receivers

Nylon thread phantom:
- Gelatin cylinder with embedded twisted nylon thread
- Diameter and height ~10 cm, nylon thread diameter 0.2 mm
- Amount of data: 23 aperture positions x 157x4 emissions x 157x9 receivers