Beam scans for sonicator probes

All scans were taken at 1MHz and 1 W/cm²

Output measurements are in kiloPascals
Results summary

• Both transducers have a relatively “unfocused” beam pattern at the target depth – the -6dB beam width is approximately 1.5-3 cm for each transducer, with the ME7410 (10 sq cm) in general larger than the 7413 (5 sq cm).

• Acoustic pressure output varies with distance by approximately 15% - with the peak pressure (averaged over a 1cm square center region) occurring at 2cm for the 7413 and 3.5 cm (or beyond) for the 7410.

• Pressure output of ~ 300 kPa is a fairly low output pressure – correlating to a mechanical index of only 0.3 – below what is usually considered the threshold for bubble cavitation and bio-effects (greater than 0.7).

• Because of the general response of the transducer in the near field – it would be recommended to move the transducer or sample during treatment for even exposure.

• Even though the transducer elements are larger – ultrasound emission is concentrated only in the center region (roughly 1.5-3 cm, depending on distance) from the transducer face, so sample alignment is important.

• A small region (~1mm) near the center of the beam in some locations had a pressure that was 50% greater than the surrounding area. As this could confound results, it would be recommended performing testing where this peak is not present (1 or 3 cm for the 7413 or 2 or 3.5 cm for the 7410).
ME7413 5mm away from transducer

-6 dB beamwidth: 18 mm
ME7413 10mm away from transducer

-6 dB beamwidth: 19.5 mm
ME7413 15mm away from transducer

-6 dB beamwidth: 16.5 mm
ME7413 20mm away from transducer

-6 dB beamwidth: 16.5 mm
ME7413 25mm away from transducer

-6 dB beamwidth: 19.5 mm
ME7413 30mm away from transducer

-6 dB beamwidth: 19.5 mm
ME7413 35mm away from transducer

-6 dB beamwidth: 19.5 mm
ME7413 maximum pressure

Average pressure over 1 square cm at center of beam
ME7410 5mm away from transducer

-6 dB beamwidth: 21.4 mm
ME7410 10mm away from transducer

-6 dB beamwidth: 21.4 mm
ME7410 15mm away from transducer

-6 dB beamwidth: 24.3 mm
ME7410 20mm away from transducer

-6 dB beamwidth: 30 mm
ME7410 25mm away from transducer

-6 dB beamwidth: 17.1 mm
ME7410 30mm away from transducer

-6 dB beamwidth: 20 mm
ME7410 35mm away from transducer

-6 dB beamwidth: 28.6 mm
ME7410 maximum pressure

Average pressure over 1 square cm at center of beam