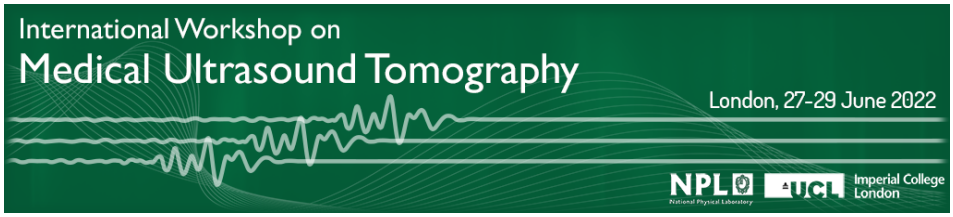

Contribution ID: **9** Type: **not specified**

Acoustic propagation in weakly nonlinear regime using ray tracing approximation with applications in HIFU

Wednesday, June 29, 2022 3:20 PM (20 minutes)

High Intensity Focused Ultrasound (HIFU) is a therapy that uses ultrasound waves to non-invasively destroy malignant cells inside the human body. The technique works by sending a high-energy beam of ultrasound into the tissue using a focused transducer. Numerically modelling HIFU presents a problem due to nonlinear effects leading to the formation of harmonics of the source frequency. Each significant harmonic requires a finer grid to resolve, rapidly increasing computational complexity. We look to use the weakly non-linear ray theory framework to reduce the nonlinear PDE in Rd to a set of one dimensional PDEs. We construct rays emanating from the transducer on which we calculate the phase of the waves via the Eikonal equation. In ray coordinates the amplitude can be found by solving the nonlinear transport equation along the ray. This equation can be transformed into the Burger's equation which we then solve and transform back to obtain the amplitude along each ray.

Preferred Contribution Type

Presentation

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