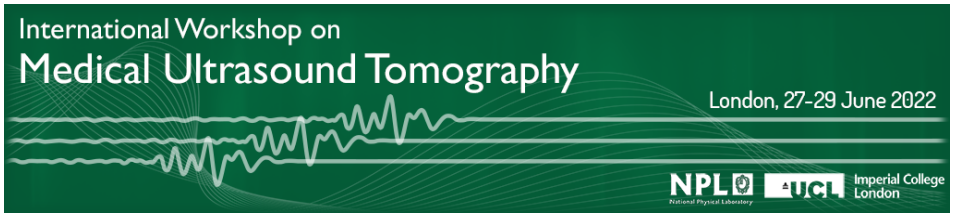

Contribution ID: **8** Type: **not specified**

Characterisation of Bone through Guided Circumferential Lamb-Type Waves

Wednesday, June 29, 2022 11:40 AM (20 minutes)

One of the most debilitating fragility fractures brought on by osteoporosis is a hip fracture, for which 1 in 3 patients die within 12 months of occurrence. The current gold standard of osteoporosis detection measures bone mineral density (BMD) by dual-energy X-ray absorptiometry (DEXA) and is specific but not sensitive enough. Ultrasound (US) is a promising alternative to BMD as the multi-scaled structural features of bone have a physical relationship with scattering and speed of US propagation. To date, the majority of US characterisation of bone has been carried out in peripheral regions (e.g. calcaneus, radius, tibiae) with longitudinal guided waves, which is then correlated with femoral BMD.

We propose a novel method using circumferential Lamb-type waves to directly characterise femurs, with a simplified cylindrical digital phantom simulated with the finite element package Pogo. A directional guided wave is excited through spatiotemporal transducers, travels through the cortical layer of the bone and the leaky wave is captured by the same transducers. This presentation will show that, given bone geometry, the inverse problem can be solved to obtain the local material property and thickness. Extension of the technique to porosity will also be discussed.

Preferred Contribution Type

Presentation

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