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Ultrasonic guided waves in bone

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Recent progress in quantitative ultrasound (QUS) has shown increasing interest towards measuring long bones by ultrasonic guided waves. This technology is widely used in the field of non-destructive testing and evaluation of different waveguide structures. Cortical bone provides such an elastic waveguide and its ability to sustain loading and resist fractures is known to relate to its mechanical properties at different length scales. As guided waves could yield diverse characterization of bone's mechanical properties at the macroscopic level, the method of guided waves has a strong potential over the standardized bone densitometry as a tool for bone assessment. Despite this, development of guided wave methods is challenging, e.g., due to interferences and multiparametric inversion problem. This paper discusses the promises and challenges related to bones characterization by ultrasonic guided waves.