

# Generation of Oblique Ultrasonic Excitations in Bone: A Numerical Study

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**Abstract:** A semi-analytical finite element scheme (SFES) was applied to simulate the propagation of ultrasonic guided wave in a bone plate, the presence of the overlying soft-tissue was taken into account. Here, the bone plate was considered as a two dimensional isotropic elastic medium and the soft-tissue was assumed to have the mechanical properties of the water. The signals source was emitted from a transducer of finite-size, operated an angle force to the plate. The Randon transform was then used to compute the wave dispersion relation. The results showed the presence of two wave groups including a fast-traveling with the velocity close to P-bulk wave speed and slow-traveling guided wave groups, in which the fast-traveling wave quickly disappeared with the increase of the angle beam. The source influence (frequency and offset) as well as the effect of soft-tissue thickness on excited wave modes was investigated. Finally, some comparisons with the experimental data were discussed.

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