

Abstract Submitted
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Non-Contact Ultrasound Imaging Applied to Cortical Bone Phantoms PETER HALCROW, KENNETH GANEZER, California State University Dominguez Hills — The purpose of this project was to take the initial steps towards applying Non-Contact Ultrasound (NCU) to the in-vivo monitoring of osteoporosis and to quantitative ultrasound imaging (QUS) of the skeleton using cortical bone. This project was also undertaken to find additional applications of NCU beyond its past limited usage in assessing the severity of third degree burns. With an NCU imaging system, a pair of specially designed broadband 1.5 MHz non-contact transducers and cortical bone phantoms we determined bone mineral density, speed of sound (SOS), integrated acoustical response (IR), and ultrasonic transmittance. Air gaps of greater than 3 cm, two transmission and two reflection paths, and a digital signal processor were used to collect data from phantoms of known mass density and bone mineral density (BMD). Significant correlations between known BMD and measured SOS, IR, and transmittance were obtained for all 14 phantoms. At least thirty to forty repeated measurements were collected over a period of 1.5 years of the SOS, thickness, and IR for our phantom set, extending through most of the in-vivo range of BMD found in cortical bone. The collected data showed a small variation in the range of measurements of plus or minus 1-2 %. These NCU results were shown to be in agreement with similar results from contact ultrasound to within 1-2%. This study suggests that NCU might find additional applications in a clinical setting in the near future in medical imaging.

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