International Journal of Engineering Sciences

(ISSN 0976 – 6693)

Volume 11 Number 3 October 2018

Research papers

Abstract: In this study, we computationally modeled and simulated the interaction of ultrasound waves with biological tissues using a simple solid sphere model of scatterers. An algorithm was developed to generate virtual tissue samples with different scatterer parameters. Propagation of ultrasound through the virtual samples was modelled using a simple theoretical model and the frequency dependent ultrasound backscatter coefficient (BSC) was calculated in the clinical frequency range of 2–15 MHz while varying the scatterer radius, number of scatterers and scatterer packing fraction. A detectable difference of BSC was observed for different packing fractions in the low frequency range of 2−3.5 MHz. Other parameters were not sensitive enough to distinguish between the different tissue samples in the clinical frequency range. This work provides ground for the development of novel ultrasound imaging techniques incorporated with computational techniques allowing ultrasound imaging to be used for early diagnosis of tissue fibrosis.

Abstract: In the present experimental research, left side of human femur bone is used. Natural frequency of human femur bone is evaluated by using FFT Analyzer. Evaluation of natural frequency is obtained by varying impact weights i.e. 50 gram, 100 gram, and 150 gram on human femur bone from height of 5 cm, 10 cm and 15 cm at a distance of 8 cm, 16 cm and 24 cm respectively. Design of experiments are carried out by using Taguchi method i.e. L_9 (3^3) Orthogonal Array. The natural frequency pattern variation is studied by using different combinations of height, length and weight. The present research indicates that for constant values of height (5 cm & 10 cm), length (8cm & 16 cm), and weight (50 grams & 100 grams), natural frequency increases linearly, while for constant values of height (15 cm), length (24 cm), and weight (150 grams), natural frequency decreases linearly.