Frequency and concentration dependence of the ultrasonic backscatter coefficient in a soft tissue mimicking material

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Abstract : In medical ultrasound, the backscatter coefficient is used to quantify the scattering properties of biological tissues. It is defined as the differential scattering cross section per unit volume for a scattering angle of 180 °.In this study, measurement of backscatter coefficient are made on Tissue mimicking Materials. These are materials whose acoustic properties (velocity, attenuation, diffusion) are close to those of biological tissues.Measurements of this coefficient have been achieved in a mixture of gelatin and distilled water containing microscopic graphite particles with mean radius of 18µm randomly distributed. Samples concentrations ranged from 50 to 200g of graphite per liter of gelatin. The backscatter coefficient was evaluated using both Sigelman and Reid and Chen methods in frequency range around 5 MHz. The evolution of this coefficient as a function of frequency and concentration of scatterers will be presented. Comparison of experimental values with those obtained from Faran theory permits estimation of number density of graphite particles in TM material.

Keywords : Ultrasound, Bakscatter coefficient, Tissue mimicking material