Ultrasonic Backscatter Coefficient Estimates in a Soft Tissue Mimicking Phantom

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Abstract : The ultimate goal of characterization methodsbased on the backscatter coefficient (BSC) estimates isto obtain structural information about samples independentlyof the measurement system. In the current study,measurements of the BSC were obtained from TissueMimicking Materials (TMM) or phantoms. These consistedof a mixture of gelatin and distilled water containingmicroscopic graphite particles with a mean radius of 18micrometers, which were randomly distributed. Phantomsconcentrations ranged from 50 to 200 g of graphite per literof gelatin. Two BSC estimation methods were used andtheir results were compared to Faran's scattering theorywhich allowed the estimation of the number density ofgraphite particles in the phantoms. Moreover, measurementsof the attenuation coefficient and the ultrasonicpropagation velocity in phantoms were performed. Theevolution of the attenuation coefficient and the BSC as afunction of frequency and scatterers's concentration in afrequency range from 1.5 MHz to 6 MHz will be presentedusing two transducers of nominal frequencies 2.25 MHzand 5 MHz. Decreasing of the attenuation coefficient withfrequency and graphite concentration will be showed.

Keywords : Ultrasound, Attenuation, backscattering, TMM