C. P. Gadgil, Study of influence of temperature on acoustic properties of materials for ultrasound thermometry, Ph.D. Thesis, Department of Electrical Engineering, Indian Institute of Technology Bombay, 1993.

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***Abstract*** **-** In industry, health care, and process control there is a need to measure temperature non-intrusively. Ultrasound has been for non-invasive measurement of process parameters. Acoustic velocity, impedance, reflection coefficient and attenuation coefficient are some of the parameters that can be used for temperature measurement. Of these attenuation coefficient is the most promising parameter because of its higher sensitivity to temperature. In a multilayered medium the reflected signals from the top and the bottom surfaces of the layer can yield information about attenuation. The common method of measuring the ratios of peak amplitudes of reflection cannot be used, when attenuation is a function of frequency, as it leads to erroneous results.

Various techniques of processing the reflected signals to measure attenuation coefficient like transfer function, impulse response, RMS time duration, RMS bandwidth, energy ratio are described. Equations relating attenuation coefficient to the above parameters in multiple layer medium have been derived. A system consisting of multiple narrow band transducers with high sensitivities and signal to noise ratios in the zones of confidence have been used to get accurate and reliable transfer function. The variations of acoustic parameters like velocity, impedance and attenuation coefficient with temperature have been measured.

Experiments carried out on materials commonly used in Biomedical Engineering yielded consistent results. The variations of attenuation coefficient with temperature have been measured. If calibration curves of attenuation coefficient versus temperature for the material under investigation are known apriori, measurement of variation of attenuation coefficient could be a convenient method for non-invasive temperature monitoring.