4.2.29. AIRBORNE ULTRASOUND INVESTIGATIONS OF POLYPROPYLENE POROUS FILM

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Airborne ultrasonic techniques, with air as the only coupling medium, expand the capability of ultrasound technologies and allow the development of simple, versatile, reliable and harmless inspection systems for industrial and medical applications, materials research and development. The main problem of air-coupled ultrasonic techniques is the very high acoustic impedance mismatch between air and transducers, which is responsible for the high attenuation of the information carrying signal between transmitter and receiver. Beside improvements of the transducer design, development of new piezoelectric or electromechanically active materials with low acoustic impedance could overcome the problem. Recently developed cellular polypropylene ferroelectret films, combining strong electromechanical response with a low density and softness, are considered as a promising material for airborne ultrasound transducers. This polypropylene porous film has remarkable piezoelectric properties and very low acoustic impedance. Therefore this film is interesting for the development of airborne ultrasound transducer, especially for the use in NDT. For the shown measurements ultrasound pulses transmitted the polypropylene film. On this occasion they are damped (reflected) and delayed in dependence upon the frequency. The used frequency ranges from 200 kHz to 600 kHz. The analysis of complex pulse spectrum yields material parameters like sound velocity and damping, which are needed for the construction of airborne transducers.