

Ultrasound longitudinal and linearly polarised shear waves propagating through a piece submitted to bending stresses rely on some physical properties such as the volume density, the elastic constants and the strain resulting from the applied forces. The present paper deals with the acoustoelasticity theory in stressed and elastically deformed media under simple bending forces. For a piece made of carbon steel (C 35) with known macroscopic properties, acoustoelastic measurements have been achieved in three zones under bending stresses (compressed, central and extended fibres). The waveforms provided by ultrasound transducers correspond to the average value of the applied stress on their surface. These responses have been simulated numerically by dividing of the transducer in slices. Simulated and measured ultrasonic waveforms in transmission configuration allow the verification of the delay effect induced by bending stresses and the amplitude modification resulting from the effect of averaging over the transducer according to its finite dimension. This method constitutes an investigating tool for the evaluation of the acoustic properties of homogeneous materials loaded elastically by variable or heterogeneous stresses