

The objective of the project

Is to characterize the internal structure and properties of each individual layer of the multi-layered plastic pipes after extrusion and cooling using the ultrasonic pulse-echo technique.

Problems of ultrasonic testing

- ▶ Strong attenuation and scattering of ultrasonic waves in particular layers;
- ▶ Similar acoustic properties between adjacent layers;
- ▶ High measurement accuracy required (<10 μ m).

Solutions

- ▶ To develop measurement technique combined with numerical model which allows to simulate the typical responses of the defected and non-defected samples;
- ▶ During the iterative comparison of the simulated response and the measured one the properties under the interest are being extracted.

Parameters

- ▶ Focused transducer,
 - ▶ $f=5$ MHz,
 - ▶ diameter 12 mm,
 - ▶ focal distance 36.5 mm;
- ▶ Measurements around the pipe at 1° step;
- ▶ Measurements along pipe axis at 1 mm step.
- ▶ During the deconvolution the numerical model was used to predict reflections from the internal multi-layered structure, taking into account the material properties of each layer, (i.e. frequency dependent attenuation, phase velocity dispersion).
- ▶ The most similar predicted waveform to the measured one, corresponds to the optimal set of the material properties used in the model which are very close to the existing in the real object.

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RELATED INFORMATION

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3. **R.Raišutis, R.Kažys, L.Mažeika.** Application of the ultrasonic pulse-echo technique for quality control of the multi-layered plastic materials // *NDT&E International*. Oxford: Elsevier Science Ltd. ISSN 0963-8695. 2008, Vol. 41, no. 4, p. 300-311. [ISI Web of Science; Academic Search Premier; Chemical Abstracts (CAplus); COMPENDEX; Science Direct; 0,333].; [/pdf/](#)
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