

**Subject**

Ultrasound differential method to evaluate the non-linear tissues parameters

**Supervisors, contact, place of research**

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**Project Description**

As a result of non-linear propagation of ultrasound in biological tissues, waves with larger amplitudes produce larger signal components on the second and higher harmonics - this relationship is approximately square in character. Preliminary results obtained in more than a dozen patients with breast changes show that in the range of standard diagnostic intensities of ultrasounds, the amplitude of the backwardly distributed waves in areas affected by neoplastic changes behave nonlinearly.

These results are very encouraging and show differentiation between healthy and pathologically changed tissues, promising well for the extension of ultrasonographic studies in the classification of neoplastic changes.

The aim of the study is to assess tissue changes based on determination of the  $B / A$  parameter in the non-linear model of ultrasound propagation in tissues and to develop a new ultrasound imaging method related to the estimation of the ultrasonic non-linear tissue coefficient based on the diffuse field. As part of the work, physical models of the medium will be developed to link the amplitude of the transmitted wave with the amplitude of the signal received in the case of non-linear propagation. Numerical experiments will be carried out to assess the presented method in terms of its suitability in the estimation of the non-linearity coefficient.

**Bibliography**

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