5.3.11. REFERENCE COMPLEX FOR METROLOGICAL ENSURING OF ULTRASONIC MEASUREMENTS IN SOLID MEDIA

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In broad fields of physical research, non-destructive quality control of materials, and technical diagnostics acoustic measurement techniques are dominating. At the present stage of the development of ultrasonic measurements in solid media, the resource for increasing the accuracy and sensitivity with traditional measuring circuits based on piezoelectric transducers has been exhausted.

Since 1971, the Far Eastern Branch of VNIIFTRI has been working on the study of the non-contact methods of measurement of acoustic parameters of solid media.

Theoretical and experimental groundwork helped lay the foundation for metrological support of acoustic measurements in solid media in ultrasonic frequency range, to create reference installations, and to develop a system for transmitting sizes of physical units (speed, attenuation of ultrasonic waves) from reference installations to working means of measurements.

The list of the designed reference installations, working standards, and worked out Metrology Instructions (MI) is given below.

1. IHA 39-A-86. Installation of the highest accuracy for storage and reproduction of a unit of speed of longitudinal and shear ultrasonic wave propagation in solid media.

MI 2055-90. SSM. The State Verification System for means of measurements of the speed of longitudinal ultrasonic wave propagation in solid media.

2. IHA 73-A-91. Installation of the highest accuracy for storage and reproduction of a unit of attenuation factor of longitudinal ultrasonic vibrations in solid media.

MI 2163-91. SSM. The State Verification System for means of measurements of the attenuation factor of longitudinal ultrasonic vibrations in solid media.

3. IHA 79-A-92. Installation of the highest accuracy for storage and reproduction of a unit of speed of ultrasonic Rayleigh wave propagation in solid media.

MI 2227-92. SSM. The State Verification System for means of measurements of the speed of ultrasonic Rayleigh wave propagation in solid media.

4. The working standard of 2-nd echelon (MAI-1) for measuring the attenuation factor and speed of propagation of longitudinal and shear ultrasonic vibrations.

5. The working standard of 2-nd echelon (MWAC-1) for certification of converters of acoustic emission.

Now the Far Eastern Branch of VNIIFTRI is developing the State special standard for storage, reproduction and transmission of sizes of speed of propagation and attenuation of longitudinal, shear and surface ultrasonic waves in solids. At the same time, there is being conducted the study of a dynamic method of measuring physical-mechanical characteristics of the solid media which are directly connected with the speeds of ultrasonic wave propagation in solid media. The results of this work will be aimed at strengthening the capacity of the designed state special standard and certifying it as the original means for measuring physical-mechanical characteristics of solid media.