ANALYTICAL REVIEW OF THE POSSIBILITIES OF SPECTRAL METHODS FOR DIAGNOSTIC DAMAGE OF ELECTROMECHANICAL EQUIPMENT

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Assessment of the technical condition of electromechanical equipment is the most important element of all basic aspects of operation of electromechanical equipment (EME). Its main task is to identify equipment defects and malfunctions.

To date, one of the most popular methods of detecting malfunctions is spectral analysis, which combines the methods of qualitative and quantitative determination of the composition of an object. These are: acoustic control - uses oscillations of ultrasonic and sound ranges with a frequency from 50 Hz to 50 MHz. Such fluctuations occur in the area of elastic deformations of the medium, where stresses and deformations are proportionally related. According to the nature of registration of vibrations, acoustic methods are divided into amplitude, frequency, and spectral. The advantages of these acoustic methods [1]: detection and registration of newly developing defects is ensured, thereby allowing to classify defects according to the degree of their danger; in production conditions, it is possible to detect an increase in the crack by tenths of a millimeter; provide control of the entire facility using certain transducers; carry out thermal and waterproofing control; prevent catastrophic destruction of structures during testing and operation by assessing the rate of development of defects; and also determine the places of flow. Disadvantages of these methods: acoustic signals, as a rule, are difficult to distinguish from obstacles; the need for further diagnostics of controlled objects by other methods; the use of these methods on openly laid cables, cables in channels, tunnels is not recommended, since due to the good propagation of sound along the metal sheath of the cable, a large error can be made in determining the location of damage; as well as the need for expensive equipment.

Vibrodiagnostics – vibration analysis, supplemented by thermal control of individual nodes, drive motor current and, in some cases, the composition of the lubricant, became the basis of a new direction of technical diagnostics, which was called machine condition control and diagnostics [2-4]. The advantages of vibrodiagnostics are a wide range of diagnosed parameters; conducting diagnostics on working equipment; while the disadvantages are the need to use special vibroacoustic sensors and the complexity of their installation, the dependence of the vibration level

on a number of factors, the difficulty of obtaining a vibration signal. The difficulty of performing diagnostics on hard-to-reach equipment can also be noted as a disadvantage [3].

Recently, the spectro-current analysis of the state of electric machines [3, 5], which is based on monitoring the consumed current followed by a special spectral analysis of the received signal, has been widely developed in the world, which allows determining the state of various elements of electromechanical equipment with a high degree of reliability. This method is the most effective, as it allows you to store large databases on the computer with information on the dynamics of damage to the monitored EME, with subsequent prediction of its failure.

According to the above, it can be concluded that the methods based on spectral analysis have quite significant advantages in the diagnosis of electromechanical equipment. Many modern systems use spectral analysis, as it is possible to store a database of EME malfunctions with further determination of the residual resource.

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