THE METHOD OF MULTIPLEX MAGNETOMETRY ELEMENTS FOR ASSESSMENT OF ROLLING STOCK

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Elements of rolling stock and road transport during the operation exposed the combined impact of various external factors that lead to their failure. Detecting damage with external signs occurs during planned inspections using mainly external review Custom calibration of non-destructive testing (NDT). It is known that many metal destruction is due to exhaustion fatigue strength, and external signs of this process is usually not [1]. Existing techniques do not allow the NDT to fully assess suitability for further use hardware that are part of the rolling stock, so there is an urgent need to develop new methods of NDT and monitoring to assess their condition.

One of the most promising directions for that use magnetic control, so that this type of NDT does not require sophisticated equipment, not accompanied by the presence of harmful factors and is very informative [2].

A common problem, for all types of diagnostics, irrespective of physical sense of the process, is the low level of a useful signal from the sensor which can be compared with noise level. And if, considerable improvement of measuring devices in the sensitivity and selectivity field of sensors is extremely difficult [3, 4], so modern methods of processing of the received signal allow to increase considerably the quality of diagnostics.

For the signal processing with the MR-sensor it is proposed to use algorithms based on chaos theory and the principles of non-linear mechanics

The task of the researches is development of the approach which is based on the analysis of collective effects in the synergetic scheme which would allow to add the concrete mechanism of structurization on the basis of the formalism of the fractal Brownian motion to the analysis and to consider the multilevel plan of structurization as gradual development of cluster fractal structure.

Projecting the given analysis technique on identification of useful information in a signal with the high level and noise density it is possible to increase considerably the quality of technical objects diagnostics. It opens prospects for identification of dangerous object conditions at the stage preceding its destruction.

As dynamics of the difficult system evolving in time is observed usually as a dynamic series of some characteristic which creates a database for the analysis and identification of dynamic behavior of the system by means of the methods of nonlinear dynamics, so such analysis will allow to find useful information in the signals from the sensor with the high level and noise density during technical objects diagnostics.

To trace the state function of the studied system according to the change of the concentration of reagents which are directly connected with this function. Identification of the area of initial data at which choice it is possible to expect self-organization with formation of the periodic space-time modes, represents rather a complex problem as its decision demands carrying out extensive studies. At this stage of the researches we were limited to study of the self-oscillating modes especially as these modes define, apparently, the characteristics of the structural organization of initially disordered polymeric medium.

We got the evidence of essential possibility of mode realization of the deterministic chaos in the studied process when fluctuations of the parameter connected with concentrations of reagents in the studied medium form fractal structures.

In a scientific research institute "Iskra" East Ukrainian Volodymyr Dahl National University created breadboardversion of the magnetometric device with which to implement the described approach for signal processingThe main requirements to the magnetometric device for determination of the operability of metal structures are established. The configuration and blocks which are its part are chosen. It is defined that the chosen structure and device components fit the research requirements, blocks are compatible and the system has no “weak links”. According to the test results of a device model sample, the display way, optimum in informational content, of the research results of metal structures, on the measuring block is established. The problem of parameters of a radio channel, power supplies and service functions demand additional research.

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