ABSTRACT

The master's thesis consists of four sections, 94 pages, 37 illustrations, 22 tables, 30 sources of literature were processed.

In the process of controlling various materials, an important factor is control performance. The use of automated systems significantly increases the rationality of flaw detection during production.

One of the most common structural materials in the industry is aluminum. Quality control is an important task, however, and there is a need for increased speeds of control.

The master's thesis includes four sections. The first section consists of an analytical review of automated eddy current systems, an overview of the object of control, and theoretical calculations of the importance of eddy current flaw detection.

The second section provides a calculation of the overhead differential VSP from which the matrix VSP consists. Several variants of the structural diagrams of the system have been developed to provide different control performance. Measuring channel components, such as amplifier, bandpass filter, and analog-to-digital converter, have been calculated.

The following section describes the algorithm of operation. The results of the simulation of the Mathlab software environment are presented, and the probability of control is calculated based on it.

The last section is about developing a startup project.

The aim of the study:

Increase the likelihood of controlling the detection of surface and subsurface defects while controlling aluminum sheets in dynamic mode.

Object of study:

The process of generating VSD signals and estimating their parameters.

Subject of study:

The method and means of detecting VSD signals while controlling objects in dynamic mode.

Novelty:

The use of circular statistics obtained by using the phase characteristics of the signals of the IR is substantiated.

The dependence of the magnitude of the circular statistics on the noise / signal ratio and the frequency of the carrier signal to the sampling rate were established, which made it possible to substantiate the necessary parameters of the information collection system.

Practical value:

Development of methodology and software tool for processing of signals of VSD, which allows to create phase detectors of signals of VSD generated by small size defects.

Keywords: eddy current flaw detection, Hilbert transform, phase, circular statistics.