DISTRIBUTION CALCULATION OF MAGNETIC FIELD DETECTION DEVICES INDUCTION FERROMAGNETIC BODIES

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The influence of gender in the ferromagnetic body on the overall distribution of the magnetic field induction type detection device, taking into account the heterogeneity of its magnetic field with further experimental confirmation of the results.

Ferromagnetic body distribution, magnetic field induction device.

Agro-industrial complex processed a large number of bulk agricultural materials. One indicator of the quality of these materials is normalized content of ferromagnetic admixtures set regulations: for flour and grain - to 3 mg / kg for feed - 30 mg / kg in products [1, 2]; Failure to do so results: the hit ferromagnetic particles to lower product quality, larger bodies - to emergencies and premature failure of process equipment.

Existing equipment for extraction of ferromagnetic bodies (FMT) - zalizoviddilyuvachiv has a large variety of designs but does not meet the modern requirements resursoenerhozberezhennya [3-5].

To reduce power consumption and material consumption of electrical goods requires the use of induction detection devices that will change the mode of constant zalizoviddilyuvacha to "expecting".

The aim - to identify and study the induction device parameters we attempt to determine its interaction inhomogeneous magnetic field and FMT with further experimental confirmation.

Material and methods of research. If FMT in a uniform magnetic field (grad H0 = 0) it creates its own (Figure 1), which leads to the appearance of the total, which is described by the expression [6]

Vyrazspravedlyvyy in a uniform magnetic field, but the detection devices is a heterogeneity that ultimately affect the total field.

In practice, the calculation of the distribution of the magnetic field along the axis of the winding electromagnetic devices used by authors known expression:

Expressing through magnetic induction considering that substituting in the expression that describes the total magnetic field on the axis of the winding device detection considering its heterogeneity and influence FMT

The dependence to determine the total magnetic induction Bx parameters of the winding device identification (current I, the average radius of winding turns Rsr) and FMT parameters (diameter - d, the distance from the body to the point of observation - R).

As seen on the surface of the magnetic induction FMT increases relative to the main magnetic induction field about 3 times, and this value is not dependent on the size FMT. The size of the body affected, the nature of change induction - the larger, the more a decrease smoothly with increasing distance from it.

To confirm the accuracy of the theoretical dependence experimental studies were conducted in accordance with the scheme.

Measurements were carried Millis-Teslameter EM 4305 probe based on the Hall sensor, which allows point measurements of magnetic fields. During the experiment varied parameters such as current strength (0.5 to 3A with the step 0,5A) distance from the observation point to the FMT - 0 ... 100 mm increments depending on the changing nature of experimental data size FMT (5 up to 23 mm).

The results of the study. The experimental data and their comparison with theoretical dependences shown in Fig. 5:

Comparison with experimental data shows good convergence of calculation - relative error over the entire range of measurements does not exceed 6% when measuring the magnetic field in only one case is 9.4%, which for the practice of measuring magnetic fields are permissible value.

Conclusions

Thus, the theoretical analysis of the relationships and experimental verification show that the magnetic field on the surface of the FMT independent of its diameter

exceeds basic and about 3 times. At the same time the size of an impact on the changing nature of the relationship between the magnetic field - the larger the FMT, the more smoothly changes the induction with increasing distance from the body.