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Research of the Process of Turning a Plastic Housing with an Excessive

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ABSTRACT. The article presents the results of studies of the process of turnover of the reservoir body with an angle and by determining the angle of inclination of the dumped formation to the bottom of the furrow.

KEYWORDS: plow, body, removable, formation, formation rotation process, the angle of inclination of the dumped formation to the bottom of the furrow, the depth of processing, the thickness and angle of cut of the cut off, removable part of the formation

I. INTRODUCTION

In recent years, in agricultural production, plows are widely used, equipped with housings with coal-bearing removals. However, until now, the process of formation rotation by such bodies and the factors affecting it has not been sufficiently studied. These studies have been carried out to fill this gap.

Assume that a casing with an angle of removal processes a layer of thickness a and width b. In this case, the first one cuts off part of the formation in the form of a BFE triangle and drops it to the bottom of the furrow, then the main body wraps the formation in the form of AEFCD (Fig. 1). Under the influence of the body, the rotation of this layer first occurs relative to the edge D, and after it occupies a vertical position AEEFFCCD, relative to the edge C, which has taken the position C′, until the face EF lies on a previously dumped formation and occupies the position A1E1F1C′D1.

II. SIGNIFICANCE OF THE SYSTEM

In recent years, in agricultural production, plows are widely used, equipped with housings with coal-bearing removals. The study of literature survey is presented in section III, methodology is explained in section IV, section V covers the experimental results of the study, and section VI discusses the future study and conclusion.

III. METHODOLOGY

It is known [1,2] that if the angle of inclination δ of the dumped formation to the bottom of the furrow is less, the better the quality of plowing, because at the same time, a complete and deep incorporation of plant residues and weeds is achieved.

From the diagrams in Fig. 1 it follows that

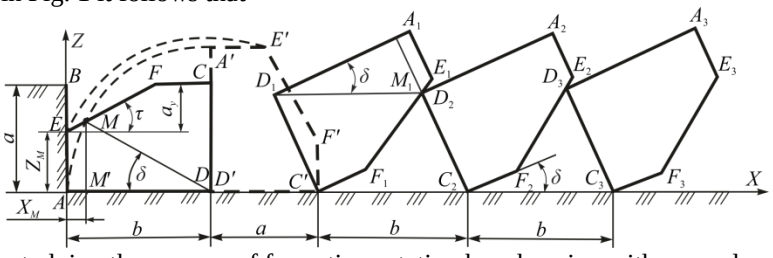

Fig. 1. Scheme for studying the process of formation rotation by a housing with an angle-removable housing and determining the angle of inclination of the dumped formation to the bottom of the furrow

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$$\delta = \angle M_1' D_1 M_1 = \angle M' DM = arctg \frac{Z_M}{b - X_M}, \quad (1)$$

where XM, ZM are the coordinates of the intersection point (point M in Fig. 1) of a circle with radius b and center at point D and a straight line EF along the X and Z axis.

We determine the unknown values of XM and ZM in expression (1). For this, we compose the equations of a circle centered at point D and radius b and a straight line FE in the coordinate system XZ

$$(X - b)^2 + Z^2 = b^2 \quad (2)$$

and

$$Xtg\tau = Z - (a - a_y)\ , \quad (3)$$

where ay, τ are, respectively, the thickness and cutting angle of the part of the formation cut off by the angle of removal.

Solving expressions (2) and (3) together, we determine the coordinates of point M along the X and Z axes

$$X_M = \left(\left[b - (a - a_y)tg\tau \right] - \sqrt{\left[b - (a - a_y)tg\tau \right]^2 - (a - a_y)^2 (tg^2\tau + 1)} \right) \times$$

$$\times \cos^2 \tau \quad (4)$$

and

$$Z_M = \left(\left[b - (a - a_y)tg\tau \right] - \sqrt{\left[b - (a - a_y)tg\tau \right]^2 - (a - a_y)^2 (tg^2\tau + 1)} \right) \times$$

$$\times 0{,}5 \sin 2\tau + (a - a_y)\ . \quad (5)$$

Substituting the obtained values of XM and ZM in (1), we obtain the following expression for determining the angle of inclination to the bottom of the furrow of a dumped formation

$$\delta = arctg \left\{ \left(\left[b - (a - a_y)tg\tau \right] - \sqrt{\left[b - (a - a_y)tg\tau \right]^2 - (a - a_y)^2 (tg^2\tau + 1)} \right) \times \right.$$

$$\left. \times 0{,}5 \sin 2\tau + (a - a_y) \right\} : \left\{ \left(\left[b - (a - a_y)tg\tau \right] - \right. \right.$$

$$\left. \left. - \sqrt{\left[b - (a - a_y)tg\tau \right]^2 - (a - a_y)^2 (tg^2\tau + 1)} \right) \cos^2 \tau \right\}. \quad (6)$$

From this expression it follows that the angle of inclination to the bottom of the furrow of the formation dumped by the hull with the coal-bearing seam depends on its thickness a and width b, thickness ab and shear angle τ of the part of the seam cut off.

It can be seen from the graphs in Fig. 2 that an increase in the thickness of the cut off coal-bearing part of the formation and a decrease in the angle of its cut leads to a decrease in the angle of inclination to the bottom of the furrow of the dumped formation, and therefore to an improvement in the quality of plowing.

IV. EXPERIMENTAL RESULTS

Assuming that the thickness and width of the treated formation are known in Fig. 2, graphs of the change in the angle of inclination to the bottom of the furrow of the dumped body with the coal-bearing seam are plotted depending on the thickness and shear angle of the part of the seam cut off by the coal-seam.

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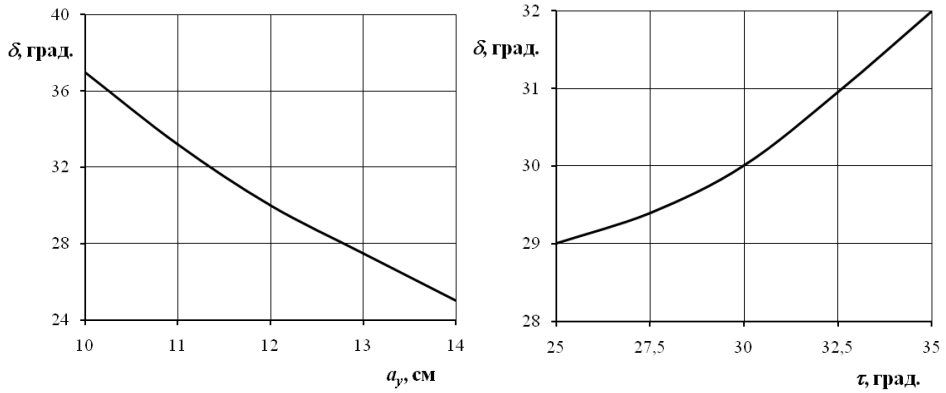

a) b)

Fig. 2. The dependence of the angle of inclination of the dumped formation to the bottom of the furrow from ay (a) and τ (b)

V. CONCLUSION AND FUTURE WORK

It can be seen from the graphs in Fig. 2 that an increase in the thickness of the cut off coal-bearing part of the formation and a decrease in the angle of its cut leads to a decrease in the angle of inclination to the bottom of the furrow of the dumped formation, and therefore to an improvement in the quality of plowing.

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