8. Design of elements of clamping as cutting plates and housing of cutting block provides action of clamping forces on the direction of the cutting force components that ensures additional sampling possible gaps in the design of the cutting process.

Fixing system of the cutting block in the housing module (fig. 3) also technological and reliable. Cutting block mounted on the cylindrical surface in the hole, where previously through the other hole entered into one element of the clamping mechanism ("cotter"). Then introduced another "cotter" and both "cotter" tightening screws, thus providing reliable clamping of cutting block between two "cotters" and exclusion of movement of cutting block in all directions. The exact location of "cotters" relatively cutting block considers direction acting on cutting plate cutting forces – clamping force directed along the cutting forces, which eliminates gaps in the contact elements during vibration system.

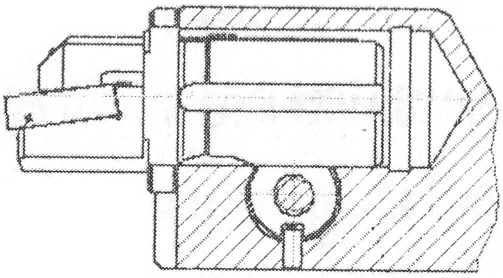

Fig. 3. Fixing system of the cutting block in the housing module

Thus, the reliability of the proposed design of block-modular cutting tools is dependent on the accuracy of performing linear and angular parameters of the components, material selection and details of the heat treatment, and compliance with the sequence of assembly and adjustment tool.

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UDC 517.537.3=111

FINDING OF RADIUS OF CONVERGENCE OF THE POWER SERIES CONTAINING NOT ALL POWER (X-A) WITH THE HELP OF FORMULA BY MEANS OF SIMPLE TRANSFORMATION OF COEFFICIENT OF THE SERIES

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Functional series of the form:

$$a_0 + a_1(x-a) + a_2(x-a)^2 + ... + a_n(x-a)^n + ... = \sum_{n=0}^{\infty} a_n(x-a)^n , \quad (1)$$

where $a_n \in R$, $n = 0,1,2,...$, $a \in R$ are called a power series. Numbers $a_0, a_1, a_2, ..., a_n$ are called coefficients of power series.

If $a = 0$ we receive a series of the form

$$a_0 + a_1x + a_2x^2 + ... + a_nx^n + ... = \sum_{n=0}^{\infty} a_nx^n , \quad (2)$$

we will examine such power series from the point of view that if in series (1) put $x - a = y$ one can always go to a series which looks like form (2).

Abel's theorem implies that if $x_0 \neq 0$ there is a point of convergence of power series (2), the interval $(-|x_0|;|x_0|)$ consists of points of convergence of this series; at all values x out of this interval series (2) diverges. Interval $(-|x_0|;|x_0|)$ called the interval of convergence of power series. Putting the interval of convergence can be written as $(-R;R)$. The number R is called the radius of convergence of the power series.

For finding of radius of convergence of power series (2) in the majority of manuals are offered to use the following formulae:

$$R = \lim_{n\to\infty} \left|\frac{a_n}{a_{n+1}}\right| \tag{3}$$

$$R = \lim_{n\to\infty} \frac{1}{\sqrt[n]{|a_n|}} \tag{4}$$

which are derived from Dalamber and Cauchy's criterion. To derive formula (3) one will make a series of modules of members of these power series:

$|a_0| + |a_1x^1| + |a_2x^2| + ... + |a_nx^n| + ...$ to the turned-out series we will apply a criterion. Assume that there is a limit $\lim_{n\to\infty} \left|\frac{u_{n+1}}{u_n}\right| = \lim_{n\to\infty} \left|\frac{a_{n+1}x^{n+1}}{a_nx^n}\right| = |x| \lim_{n\to\infty} \left|\frac{a_{n+1}}{a_n}\right| \neq 0, x \neq 0.$

On the basis of the d'Alembert series converges if

$$|x| \lim_{n\to\infty} \left|\frac{a_{n+1}}{a_n}\right| < 1 \tag{5}$$

the series made of modules of members of series (2), diverges at those values, for which $|x| > \lim_{n\to\infty} \left|\frac{a_n}{a_{n+1}}\right|$. Thus, for series (2) the radius of absolute convergence is given by (3).

Similarly, having used Cauchy's radical criterion, it is possible to establish that the radius of convergence can be found by formula (4).

Consider the example of how to use the above formula is the radius of convergence of the power series.

Example 1. Find the radius of convergence of the power series $\sum_{n=1}^{\infty} \frac{x^n}{n}$.

Solution: For the above series $a_n = \frac{1}{n}$; $a_{n+1} = \frac{1}{n+1}$ using the formula (2) we obtain:

$$R = \lim_{n\to\infty} \left|\frac{\frac{1}{n}}{\frac{1}{n+1}}\right| = \lim_{n\to\infty} \left|\frac{n+1}{n}\right| = 1.$$

But it should be noted that formulae (3) and (4) must be used very carefully, as if the infinite set of coefficients addresses in zero, it is impossible to use the specified formulas. For example, we will take a series $\sum_{n=1}^{\infty} \frac{x^{2n}}{n}$ at it the infinite set of coefficients is zero, namely all coefficients at odd degrees are equal to zero, in too time coefficients at even degrees are other than zero. Applying (3) we receive on the one hand $R = \lim_{n\to\infty} \frac{a_{2n}}{a_{2n-1}} = \infty$, on the other $R = \lim_{n\to\infty} \frac{a_{2n+1}}{a_{2n+2}} = 0$.

We will take any point x_0 other than zero, then, as $R = \lim_{n\to\infty} \frac{a_{2n}}{a_{2n-1}} = \infty$ x_0 is a convergence point, but on the other hand in view of the fact that $R = \lim_{n\to\infty} \frac{a_{2n+1}}{a_{2n}} = 0$ same the point is a divergence point, so we received a contradiction.

This occurs when the number does not contain all power x. For example:

$$\sum_{n=1}^{\infty} \frac{x^{2n}}{n} = \frac{x^2}{1} + \frac{x^4}{2} + \frac{x^6}{3} + ... + \frac{x^{2n}}{n}$$ (contains only even degrees x) or

$$\sum_{n=1}^{\infty}\frac{x^{2n-1}}{n}=\frac{x^1}{1}+\frac{x^3}{2}+\frac{x^5}{3}+...+\frac{x^{2n-1}}{n}$$ (contains only odd degrees x).

In this regard, many authors recommend to use at determination of radius of convergence of such power series directly Dalamber and Cauchy's criterion without resorting to general formulas for determining the radius, which complicates the calculation limit.

In this report we will consider a method of finding of radius of convergence which allows to work not with the general member of a row as in Dalamber or Cauchy's criterion, and uses only coefficients of the series, by their simple transformation.

Example, our series $\sum_{n=1}^{\infty}\frac{x^{2n}}{n}$ convert to a form that will contain all the powers x. We will divide all coefficients at n into that expression which faces n in an exponent. The exponent is equal in our example 2n respectively we will divide all coefficients at n on 2. $\sum_{n=1}^{\infty}\frac{x^n}{\frac{n}{2}}$

Find the radius of convergence of the series obtained by the formula (3):

$$R=\lim_{n\to\infty}\left|\frac{\frac{1}{\frac{n}{2}}}{\frac{1}{\frac{n+1}{2}}}\right|=\lim_{n\to\infty}\left|\frac{2(n+1)}{2n}\right|=1$$

Find the radius of convergence of the original series by d'Alembert:

$$\lim_{n\to\infty}\left|\frac{\frac{x^{n+1}}{n+1}}{\frac{x^n}{n}}\right|=\lim_{n\to\infty}\left|\frac{(n)x^{n+1}}{(n+1)x^n}\right|=\lim_{n\to\infty}\left|\frac{xnx^n}{(n+1)x^n}\right|=|x|\lim_{n\to\infty}\left|\frac{n}{n+1}\right|$$

$$|x|<\frac{1}{\left|\lim_{n\to\infty}\left|\frac{n}{n+1}\right|\right|}\to|x|<\frac{1}{1}=1,\ \text{т.к.}\quad R=|x|,\ \text{то}\ R=1.$$

As we can see the result is the same.

We will consider now a series $\sum_{n=1}^{\infty}\frac{x^{an}}{b^{cn}}$, где a,c – coefficients at n, $a,b,c\in R$.

Find the radius of convergence by d'Alembert

$$\lim_{n\to\infty}\left|\frac{\frac{x^{a(n+1)}}{b^{c(n+1)}}}{\frac{x^{an}}{b^{cn}}}\right|=\lim_{n\to\infty}\left|\frac{x^{an}x^a b^{cn}}{b^{cn}b^c x^{an}}\right|=|x^a|\lim_{n\to\infty}\left|\frac{1}{b^c}\right|$$, on a formula (5) we receive:

$$|x^a|\lim_{n\to\infty}\left|\frac{1}{b^c}\right|<1\to|x^a|<\frac{1}{\lim_{n\to\infty}\left|\frac{1}{b^c}\right|}=\lim_{n\to\infty}|b^c|\to|x|<b^{\frac{c}{a}}$$, as $|x|=R$ receive

$R=b^{\frac{c}{a}}$. Based on this, I guess in the original series can be divided both coefficients on the same natural number not equal to 0. That is, in the original series coefficients, divide by a:

$$\sum_{n=1}^{\infty}\frac{x^{\frac{a}{a}n}}{b^{\frac{c}{a}n}}=\sum_{n=1}^{\infty}\frac{x^n}{b^{\frac{c}{a}n}}.$$

As you can see, we get a series in which all the powers at present, therefore, we can apply the formula (3) and (4), which greatly simplifies the calculation of radius of convergence.

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UDC 665.76

RESEARCH OF THE ALKYLATION PROCESS OF PHENOL BY TETRAMERS OF PROPYLENE ON ION-EXCHANGE SMOLS

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The article is described the regularity of phenol alkylation process by tetramers of propylene by ion exchange catalyst. This process possesses a current interest in manufacturing of phenol engine additive. Reaction's conversion and selectivity were estimated in different circumstances.

Currently in the process of synthesis of alkyl phenol by phenol alkylation of propylene tetramers used ion exchange the catalyst has a high sensitivity to moisture, even at 3 wt% water using it ineffective until the maximum permissible temperature of operation. Given that the maximum operating temperature sulphocationite TULSJON T-66 is 403 ° K (130 ° C), its application requires the provision of special technological conditions on the content of moisture in the system / 1 /.

Basic physical and chemical properties of the samples of ion exchange resins in passport supplier are shown in Table 1.

Table 1–Basic physical and chemical properties of the samples

Catalyst	Bulk density	Specific surface area, m2 / g	Pore diameter, A	Total capacity, eq / kg	Maximum operating temperature, ° C
Catalyst 1	610	53	300	4,7	120
Catalyst 2	560	50	300	5,0	150
Catalyst 3	770	33	240	5,4	150
Catalyst 4	500	35	450 – 500	4,9	130
Catalyst5	540 – 580	45 – 60	120 – 300	4,7	–

Synthesis alkylphenol based catalysts investigated

Alkylphenol synthesized by apkilirovaniya phenol tetramers of propylene catalyst cation exchange (ion exchange resins) . Temperature range study agreed with the industry and is 130-150 ° C. Diffusion inhibition removable stirrer at a speed above 300 rev / min , and the reaction takes place in the kinetic mode / 1 / . In the studies of the impeller shaft speed was maintained at 350 rev / min.

Study phenol alkylation tetramers of propylene was carried out in a three necked reaction flask using a reflux condenser for condensing the vapor; the reaction temperature was recorded with a laboratory thermometer ; intensive stirring of the reaction mixture was carried out using a laboratory stirrer throughout the alkylation process . The first component introduced into the reaction mixture was phenol. After introduction of the catalyst was filled in phenol required mass quantity by weight of the mixture. The heated mixture was stirred for one hour to prepare the catalyst and swelling ; propylene tetramers further injected into the reaction mixture . Duration of the experiment was 180 min. The ratio of phenol: alkene depending on a series of experiments were on the level:

- 2:1 mol / mol, and a catalyst loading of 20% (wt.) relative to the weight of the reaction mixture - lot 1 ;
- 4:1 mol / mol and a catalyst loading of 20% (wt.) relative to the weight of the reaction mixture - two series ;
- 4:1 mol / mol and a catalyst loading of 10% (wt.) relative to the weight of the reaction mixture - 3 series ;
- 6:1 mol / mol and a catalyst loading of 10% (wt.) relative to the weight of the reaction mixture - 4 series .

Reference points were selected the following indicators:

1) concentration monoapkilfenolov ;