CONFIGURATION AND STUDY OF CENTRIFUGAL SPERATOR EQUIPMENT VERIFICATION CIRCUIT

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ABSTRACT

Adjustment contour analysis and structural scheme of the adjustment contour. We carry out the system research in the SIMULINK dynamic systems modeling package in the MATLAB system, which is designed for the synthesis and analysis of automatic tuning systems. The capabilities of the SIMULINK system are wide in researching the dynamics of automatic systems, as well as in the implementation of automatic control theory methods. The studied system is presented in the form of a structural scheme. The elements are selected from the typical links available in the SIMULINK library. In the study of analysis methods, the SIMULINK program provides the ability to calculate the transfer function for a given structure, to display the frequency characteristics and the results of transition processes graphically .

***Key words**: Separator , pressure , technological process , controlling , MATLAB, automatic control .*

INTRODUCTION

The functional scheme developed for the automation and control of the technological process provides control, automatic adjustment, light and sound signaling (deviation from the given values). A microcontroller is used to monitor and control the process. Centrifugal separator TsS-101 is usually included in the unit of the sulfurization workshop. The production capacity of sulfonate precipitate S-150 averages 17,000 tons per year.

It serves to remove sulfurized oil from bitter tar, and separators can work in parallel. The TsS-101 separator is equipped with a number of KIPva A, which also serves for its safe operation. The consumption of sulfurized oil in the separator is registered by means of FIRC-1, FIRCSA-2 devices, and TsS-101 is registered by the valve located in front of the line that delivers sulfurized oil to the separator.

The pressure of the working fluid supplied to the separator . PSA is monitored using instruments in position -5 . When the pressure is below 0.45 MPa , the separator stops and the alarm is activated.

The pressure of nitrogen at the inlet of the separator was controlled by means of instruments in position PIR-3, PIRCSA-4-2. When the pressure is below 0.10 MPa , the separator stops and the light and sound alarm work. Nitrogen pressure above the separator cover is monitored by a device in position PIR-3. When the pressure reaches 1 kPa, the separator stops and the light and sound alarm work.

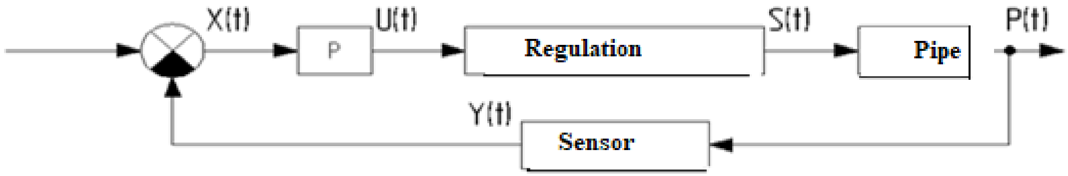
MATERIALS AND METHODS

Nitrogen consumption under the separator cover and transfer crankcase is controlled by instruments in position FIRCSA-4. If the consumption is lower than 1 nm^3/ch, the protector (blocking) works and the separator stops.

Sulfurized oil obtained after the separator is fed to mixer M-301/1, M-301/2 for neutralization. Bitter tar E-110 is supplied to the volume reducer. The process of removing sulfurized oil from bitter tar is carried out in a gasoline-adder solution. Therefore, when selecting control devices and control elements, explosion protection is required in the first place. The conditions of the technological process allow the use of tools of the accuracy class of 0.75%. P/I converters are provided with spark arrestors .

The MATLAB system includes the Simulink package for modeling dynamic systems. The possibilities of this package are great in researching the dynamics of automatic systems and implementing methods of automatic adjustment theory. It is appropriate to use this package for mathematical modeling of the system . The need for adjustment is as follows: the degree of heating of the upper part of the column is determined by the liquid pressure, which in turn has a great effect on the purification of sulfurized oil.

The essence of temperature correction for pressure adjustment is that the given value of liquid pressure is calculated in each cycle of the control program according to the exact method and takes into account changes in the temperature of liquid vapors (linear dependence is used) [1]. However, when performing research, the real control effect is replaced by a unit-step signal, which means that no fact correction is required, and all results obtained for the system are valid for the initial conditions . In it, the control valve is the control object (RN-2 in the functional scheme); The cross-sectional surface of the product passing through the valve is its output parameter. The pipe connecting the valve with the pressure sensor transmits the medium (fluid) and pressure and converts it to S(t) and P(t). R(t) will be the input signal for the pressure sensor (RE 59-1). The signal Y(t) from the sensor arrives at the adder, where it is compared with the calculated effect Yzad(kT(t)).



Picture 1 . Functional scheme of the adjustment circuit

As a result of the comparison, the error X(t) is formed and it comes to the logic part of the PID-adjuster. At the output of the regulator, a signal is formed that determines how much the control valve U(t) should be opened.

The convenience of the resulting system is that there is a negative feedback between the output and the input of the system, which serves to measure the results of the system's behavior, while the feedback is not considered a unit [2].

A VEGABAR 52 excess pressure intelligent sensor is installed in the liquid injection pipe. In the technical documentation of this sensor, it is stated that it has the property of inertial link and has a time interval of Ts= 0.043s for providing information to the sensor module. An additional damping time Td=1s is installed in the sensor, this time is necessary to eliminate the effect of pulsations in the pitch transmission .

The processor block installed in the sensor provides an opportunity to correct the influence of external factors and non- linearity. So , the b pressure sensor can be represented as a typical inertial link:

$$W_{\partial\partial}(p) = \frac{k_{\partial\partial}}{T_{\partial\partial} \cdot p + 1}$$

Pipe . Due to the short length of the pipe between the pressure sensor and the adjustment valve, we do not take into account the delay in the flow of the product and the pressure drop. Based on this, we consider the tube as a typical amplifier circuit with an amplification factor equal to one:

$$W_m(p) = 1$$

Adjusting valve. To adjust the amount of steam coming to the 1st body, the ecoflo-GV-2 electric alarm adjusting valve for liquids and gases is used. For selected equipment and process parameters, we take the valve as a typical oscillating link and treat it as a constant-time link according to the characteristics presented in the appendix:

T1kl = 0.28 s; T2kl = 0.45 s.

Thus, the transfer function of the valve will look like this:

$$W_{кл}(p) = \frac{k_{кл}}{T_{1кл}^2 p^2 + T_{2кл} \cdot p + 1}$$

the kkl (vibration) coefficient based on the following conditions: The minimum input signal U $_{min = 4\text{ mA of the positioner}}$ corresponds to the output pressure of the valve S $_{min = 1\text{ MPa}}$. The maximum input signal U $_{max = 20\text{ mA of the positioner}}$ corresponds to the output pressure S $_{max = 3\text{ MPa}}$

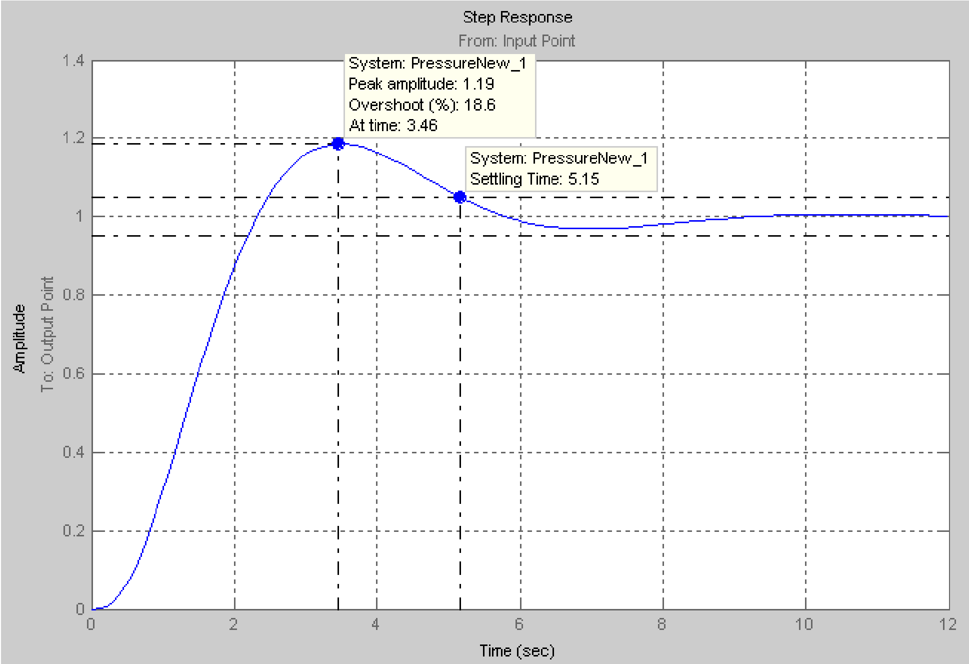
Regulator task controller performs Linear systems method Let's consider a simple method of solving the alignment problem using [3]. Because the central processor of the controller has the ability to work at a high speed (we do not take into account the discreteness of the control). During the tuning process, the PID-adjuster requires three parameters: the gain coefficient kp of the proportional channel, the gain coefficient ki of the integral channel and the gain coefficient kd of the differential channel. Taking into account that the adjuster includes a second-order compression link, we write the following:

$$W_P(p) = k_п + \frac{k_и}{p} + k_д \cdot p = k_и \frac{T_{1P}^2 \cdot p^2 + T_{2P} \cdot p + 1}{p} \qquad (6)$$

Here:

$$T_{1P}^2 = \frac{k_д}{k_и} \qquad T_{2P} = \frac{k_п}{k_и}$$

As can be seen from the figure, the system was stabilized by an oscillatory transition process. Duration of transition process tpp = 5.15 s. constitutes The readjustment is 18.6%, and the static error is zero (participating in the integral). Based on the obtained results, the following conclusions can be made: despite the obtained system being stable, the quality of the process is unsatisfactory [4,5]. High quality can be obtained when using a PID-adjuster (providing aperiodic transition process, or reducing re-adjustment to u<15%). B his for adjuster accordingly setup need _ Using logarithmic frequency characteristics, we find the optimal tuning of the tuner. To construct LChX and LFX of the system, we give the input-output points to the structure of the model and break the feedback loop.



2- picture. PID-adjuster transition graph for initial adjustment

It is worth noting that when changing, the L1(ω) curve moves up or down, parallel to itself, while φ1(ω) remains unchanged. By varying Ki, ωwe can obtain Lopt( ) from L1( ) , and it will have an optimal appearance, that is, it corresponds to a high quality transition.ω LChX for the initial adjustment of the [6]. PID controller has the following characteristics: shs<shr – the system is stable; Shchs lies with a slope of 20 db/dec of the plot; stability reserve of the system by phase tsz=51 ^{0}; L $_{z}$ →∞ dB, because ts1(shch) -180 ^{0} does not intersect with a straight line. As you can see from the picture, there is one condition that is not met. That is , the deviation of both sides of the LAX, which is not less than 0.6 decibels at the frequency cutoff limit, should be 20 db / dec [7].

It should be noted that the design of information systems that manage modern technological processes in the chemical industry, and the development of their convenient interfaces is a long and complex process. Its successful development depends, first of all, on the correct organization of the project. requires receiving. Therefore, the interface that should be developed to create convenience for the user managing the facility should incorporate all aspects of the information system. Because the main function of the interface is to organize an interactive communication to ensure the satisfaction of the user's professional needs from the resources of the information system. This in turn provides opportunities to determine in real time which issue or problem to activate, how to transmit and receive data for processing [8,9].

Computational work of the separator as an automatic adjustment system was carried out. The parametric scheme of the adjustment object and the transition process graph of the adjustment object were developed. The adjustment law and recommendations for choosing the type of adjustment were developed.

CONCLUSION

Conclusions on the results of the research. Structural scheme of the adjustment circuit. In the adjusted system, the transition process is considered operiodic, and the adjustment time is tpp=7.39c. is equal to The reset value for this process is 0. The system has an excess stability reserve in terms of phase and amplitude, for which systems the satisfactory reserve quality lies in the range of (20...50 ^{0}) in terms of phase.

Amplitude reserve should not be less than 15 dB. For the resulting system, there are increased values of the above, which means that the system properties are not fully utilized. Thus, the system satisfies all requirements for stability and speed.

REFERENCES

1. Юсупбеков Н.Р. Нурмуҳамедов Ҳ.С., Зокиров С.Г. Кимёвий технология асосий жараён ва қурилмалари. –Т:. "Шарқ", 2003. 644б.
2. Бородин И.Ф., Судник Ю.А. Автоматизация технологических процессов – М.: Колос С, 2004. – 344 с.
3. Промышленные приборы и сред ства автоматизации: Справочник/ Под
4. Abduraxmonov, O. R., Soliyeva, O. K., Mizomov, M. S., & Adizova, M. R. (2020). Factors influencing the drying process of fruits and vegetables. *ACADEMICIA:" An international Multidisciplinary Research Journal" in India*.
5. Kh.F.Djuraev , M.S. Mizomov Analyzing Moisture at the Drying Process of Spice Plants - Texas Journal of Agriculture and Biological Sciences, 2022
6. Sharipov, N. Z., Narziyev, M. S., & Ismatova, N. N. (2022). Functional Properties of the Processing Soybeans Products. *Eurasian Research Bulletin*, *12*, 50-54.
7. Djuraev, K., Yodgorova, M., Usmonov, A., & Mizomov, M. (2021, September). Experimental study of the extraction process of coniferous plants. In *IOP Conference Series: Earth and Environmental Science* (Vol. 839, No. 4, p. 042019). IOP Publishing.
8. Kh F, D., MS, M., UD, A., & NA, D. (2022). MAINTAINING THE QUALITY INDICATORS OF THE PRODUCT DURING LOW TEMPERATURE DRYING OF SPICES AND HERBS BY RESEARCHING THE OPTIMAL VALUES OF HUMIDITY AND TEMPERATURE. *International Journal of Early Childhood Special Education*, *14*(7).

9. XX Кобилов, ОР Абдурахмонов, АУ Усмонов, МС Мизомов, СА Буронов, “Методика проведение эксперимента по изготовлению угольного брикета с применением биоорганических связующих” XLV международной научно–практической конференции «Технические науки: проблемы и решения», Москва 2021.