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SOFTWARE FOR SIMULATION BASED ON PROCESSES DECOMPOSITION IN DISTILLER COLUMN

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When designing systems of automation of chemical-technological processes or when the work of contours of automatic regulation systems is researched and studied, in most cases experts define change of the process parameters value at various capacity of the technological object. For the design of the distiller for molten carbamide (Fig. 1) in [1] a scheme of decomposition of thermal and material balances (Fig. 2) was developed. According to the process decomposition scheme in the control object, the static and dynamic characteristics of the carbamide distillation process are calculated for different load modes.

Nowadays, computer information technologies are effectively used to solve automation problems to determine the state of the control object, and therefore an application software was created for visual observation of changes in the distillation process parameters [2].

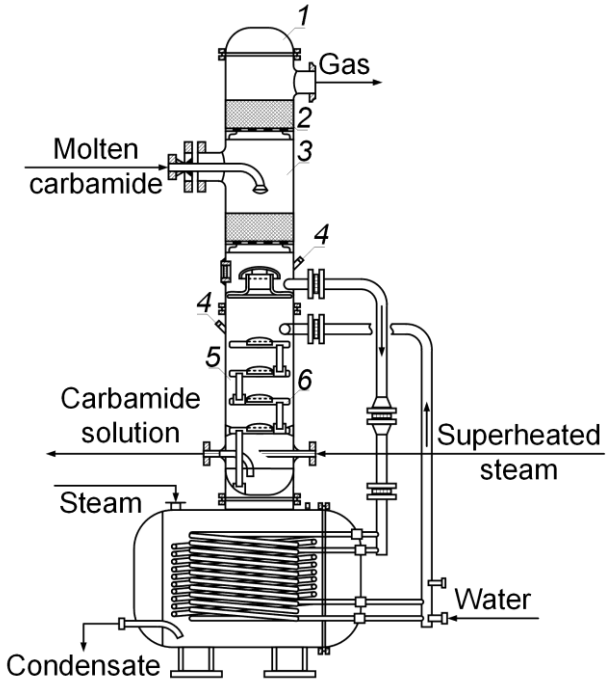

Fig. 1. Distiller design scheme for molten carbamide: *1 – condenser; 2 – filter; 3 – separating section; 4 – thermocouple connection; 5 – rectifying section; 6 – bubble cap tray*

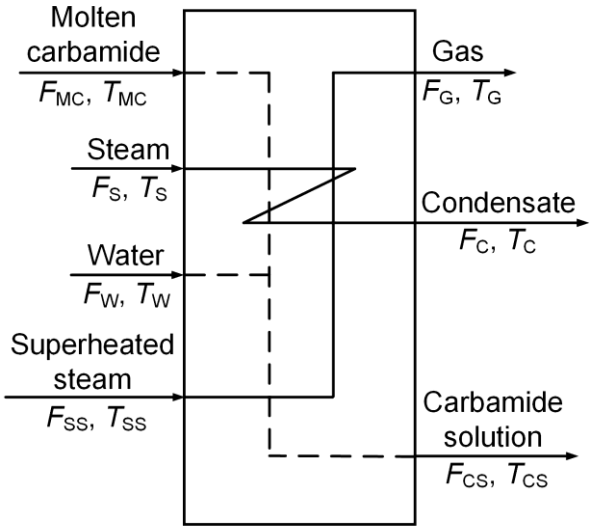

Fig. 2. Decomposition scheme of heat transfer processes in distiller for molten carbamide: *F – mass flow rate; T – temperature*

Fig. 3 shows the screen of the software for simulation of transient responses of the distiller in “work” mode. The input parameters are selected according to mathematical models and take into account: aspects of technological characteristics; physics of material flows during the movement of liquid and gaseous media; dependence

of thermophysical parameters of these media on temperature; and heat loss in the distillation column.

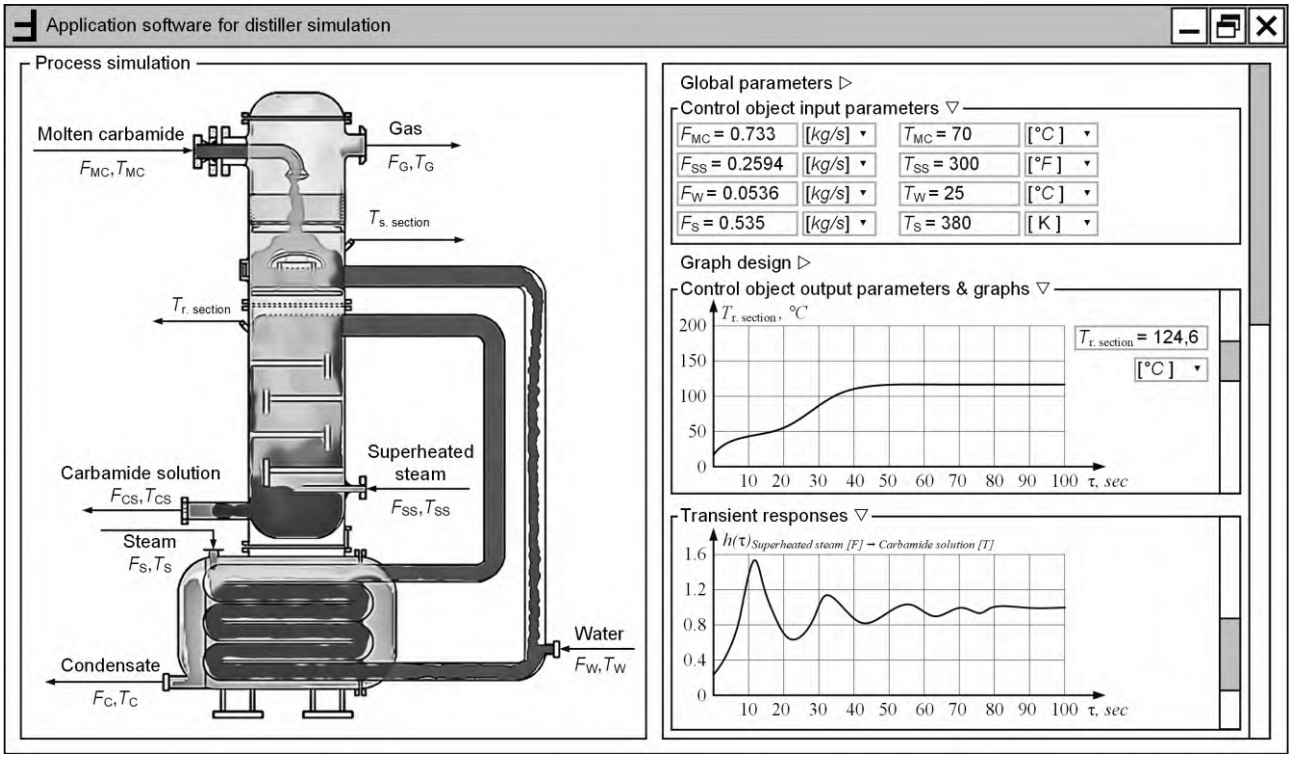

Fig. 3. Screen of the developed software for distiller simulation

The software allows users to adjust the input parameters and observe the change in output parameters as well as transient responses of control object. Thus, the simulation of the distiller allows one to visually investigate the corresponding changes in the characteristics of heat transfer processes when a new load value is established and to correct some parameters of the distillation of the molten carbamide.

Accordingly, the developed software for distillation simulation will allow solving control problems and analyzing the properties of the distillation column in the absence of a real object, using an adequate model instead.

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2. Кучкін О. М., Ковалевський В. М. Прикладна програма для імітаційного моделювання характеристик дистилятора. *Автоматизація та комп'ютерно-інтегровані технології – 2020* : Матеріали VII Міжнародної науково-практичної конференції молодих учених, аспірантів і студентів (АКІТ-2020); м. Київ, 22 квітня 2020 р. / уклад. М. В. Лукінюк. Київ : КПІ ім. Ігоря Сікорського, Вид-во «Політехніка», 2020. С. 48–49. ISBN 978-966-622-995-6.