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MODEL OF SPEEDS AND VOLUME OF CO_2 IN THE LABORATOR PHOTOBIORACTOR

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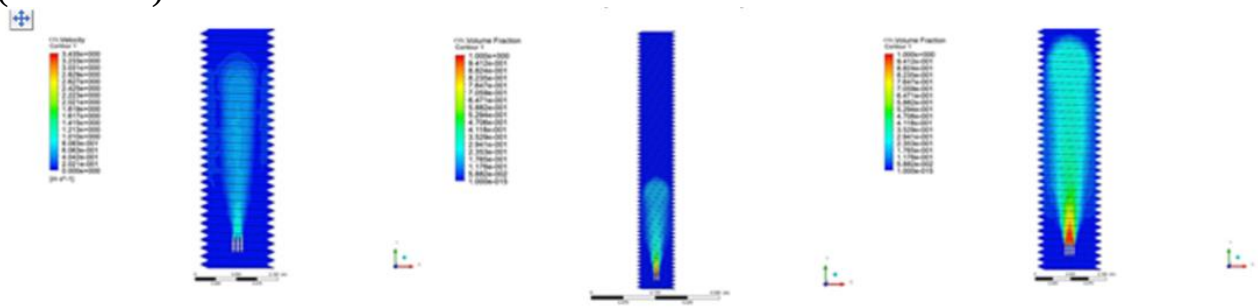
To study the work of the barboter in the photobioreactor, first of all, it is necessary to build a computer model, which will make it possible to evaluate the work of the barboter in the medium that is being studied. Creation of computer model is based on selection of equations for process description and setting conditions of uniqueness. Such conditions of uniqueness, in general case, are: geometrical, physical, limiting and initial conditions.

Geometric conditions of uniqueness. Providing geometric conditions of uniqueness is to create a 3D model of the objects that are studied. With the help of Solidworks software a 3D model was built, which consists of the volume of the photobioreactor and the model of the barboter.

Physical conditions of uniqueness. Each of the constructed volumes possesses certain physical properties, the determination of which is the establishment of the conditions of uniqueness.

Limiting conditions of uniqueness. The single-valuedness limit conditions determine the peculiarities of interaction of the system elements at the contact boundaries of volumes and outer faces.

In order to calculate the internal pressure load of the apparatus body, it is necessary to calculate the pressure that will be created by feeding a mixture of air and CO_2 (Picture 1).



Experiment 1 Experiment 2 Experiment 3

Experiment one. The target speed is 1.5 m/s. Experiment two. Set speed - 4 m/s. Experiment three. Set speed - 5.5 m/s. Time of experiment is 1 second. Among the variety of modules used in ANSYS, Fluid Flown (CFX) and Static Structure were chosen. ANSYS Fluid Flow (CFX) allows the analysis of fluid flow, unstressed and stippled fluid, as well as heat transfer, in complex geometries [1].

References:

Лабораторний фотобіореактор : пат. 102777 Україна : C12M 1/00, 1/04. № u201502888 ; заявл. 30.03.2015 ; опубл. 25.11.2015, Бюл. № 22. 3 с.