DESCRIPTION OF THE MODEL OF THE INTERACTION OF WATER AND AIR FLOWS IN THE FLOW ZONE OF THE COOLING TOWER

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ABSTRACT

When calculating the process of heat and mass transfer between water and air, it is necessary to take into account two mechanisms: convective heat transfer from the heated water to the air passing through the cooling flow path and heat transfer due to the mass transfer of evaporated water to the air stream. The cooling process is difficult to describe because the parameters of the supplied (sprayed) water and the incoming air flow vary from section to section at height n during the initial period of the process.

Keywords: Temperature change, space, Heat flow.

INTRODUCTION

The analysis of the heat and mass transfer process includes the calculation of the average parameters set in the stationary mode of the apparatus. In this case, the initial assumptions are:

1. Thermophysical properties of water and air are constant;
2. The distribution of drops over the entire volume is assumed to be the same;
3. There is no interaction between drops;
4. There is no distribution of air parameters along the radius of the cooling tower;
5. The process is stationary with a constant heat exchange surface;
6. There is a similarity between heat and mass exchange processes;
7. The air coming out of the cooling tower is completely saturated with moisture;
8. There is no mechanical entry of drops.

The main initial parameters for the mathematical model are: air pressure Rom, residual air pressure in the apparatus Ro, air consumption (Ev, heat capacity Srva, air temperature at the entrance to the apparatus tn , density pe, humidity dB and, accordingly, relative air humidity r. It will not be enough to set air values to start working in the described model, it is necessary to know the temperature of water at the entrance to the workplace T: n water flow rate Gw, In addition, it is necessary to take into account the size of the drops d and their speed I k. the geometric dimensions (diameter D, height) of the working area of the cooling tower depend on the temperature difference, the material and the surface area of the hardware shell, taking into account the heat absorption of the hardware shell and the heat flow to it from the environment. solar radiation and the resulting heat gain affect the performance of the cooling tower.

The interaction between chilled water and air is shown in Figure 2.1. The falling CILs of water interact with the counterflow of air sucked in by the vacuum pump-compressor through the cooling tower. Intensive evaporation of moisture from the surface and its transfer to the air flow occur in the diffusion boundary layer of the droplet. This increases the humidity of the air. The lower the initial humidity of the air, the more moisture is absorbed by the droplet stream and removed into the atmosphere. It is also necessary to take into account the convective movement of the water mass inside the droplet volume.

In the field of high-temperature thermal engineering of cooling towers, radiant heat exchange is faster than other water cooling methods. Therefore, when creating aggregates working at high temperatures, it is necessary to take into account the high use of radiant heat exchange. This applies primarily to boilers and industrial furnaces. It radiates energy in construction materials enterprises, between cement, lime, and clay. They include heated gases and steam. Radiation determined only by the temperature and optical properties of the emitting body is called thermal radiation.

REFERENCES:

1. Jaloliddinova Nozima Doniyorjon Qizi, Sultonov RoʻZmatjon Anvarjon OʻGʻLi Renewable sources of energy: advantages and disadvantages // Достижения науки и образования. 2019. №8-3 (49). URL: https://cyberleninka.ru/article/n/renewable-sources-of-energy-advantages-and-disadvantages (дата обращения: 01.12.2023).

2. Султонов Рузиматжон Анваржон Угли, Кодиров Хусанхон Мунаввархон Угли, Мирзалиев Бобурбек Бахтиёрович Выбор механических двигателей электрического тока, используемых в системе электропривода // Проблемы Науки. 2019. №11-2 (144). URL: https://cyberleninka.ru/article/n/vybor-mehanicheskih-dvigateley-elektricheskogo-toka-ispolzuemyh-v-sisteme-elektroprivoda (дата обращения: 01.12.2023).

3. Султанов Рузимаджон Анваржон Угли Рекомендации по выработке электроэнергии и компенсации потерянной энергии с помощью системы охлаждения электродвигателей // Вестник науки и образования. 2019. №19-3 (73). URL: https://cyberleninka.ru/article/n/rekomendatsii-po-vyrabotke-elektroenergii-i-kompensatsii-poteryannoy-energii-s-pomoschyu-sistemy-ohlazhdeniya-elektrodvigateley (дата обращения: 01.12.2023).

4. Usmonov Shukurillo Yulbarsovich, Sultunov Ruzimatjohn Anvarjohn OʻGʻLi, Kuchkarova Dilnoza Toptievna Research potential of energy saving pump unit and

hydraulic network // Проблемы Науки. 2019. №12-1 (145). URL: https://cyberleninka.ru/article/n/research-potential-of-energy-saving-pump-unit-and-hydraulic-network (дата обращения: 01.12.2023).
5. Usmonov S. Y. Analysis of Working Modes of Well Pumping Equipment Eectr //Central Asian Journal of Theoretical and Applied Science. – 2022. – Т. 3. – №. 11. – С. 119-125.
6. Karimov, N. U. ugli. (2023). SPEED CHECK OF ASYNCHRONOUS MACHINES BY CHANGING THE FREQUENCY. Educational Research in Universal Sciences, 2(15), 743–746. Retrieved from http://erus.uz/index.php/er/article/view/4880
7. Karimov , N. U. ugli. (2023). ANALYSIS OF THE INFLUENCE OF MOISTURE ON TRANSFORMER COILS. Educational Research in Universal Sciences, 2(15), 747–750. Retrieved from http://erus.uz/index.php/er/article/view/4881