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MODELLING AND SIMULATION OF HEAT TRANSFER PROCESSES FOR HEAT EXCHANGERS USED IN WASTEWATER TREATMENT

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Abstract

The issues of global warming and reducing energy consumption led to an evolutionary progress of research to find as many solutions as possible for solving these environmental issues. The need to ensure a sustainable energetic development while achieving effective protection of the environment has led to the amplification of activities based on secondary energetic resources combined with low energy consumption industrial technologies. In the present paper it is discussed how to recover thermal energy from municipal wastewater by using heat exchangers with heat pipes. Heat recovery from wastewater, besides the economic advantages also presents benefits related to environment protection: saving fossil fuels, reduction of CO₂ emissions and also exploitation of a sustainable energy source. The paper also presents results of the study on the efficiency of a heat exchanger with heat pipes, using modelling and simulation of the heat transfer. The model can be used to estimate the recoverable thermal energy and verified with field data. In this paper we have used the following equations to describe the heat transfer process: Navier-Stokes equation, continuity equation and Fourier equation. Results obtained from the researches show that the heat exchanger with heat pipes has an efficiency of over 30% compared to classical recovery systems, which allows the recovery of a large part of the heat available in wastewaters.

Key words: heat recovery, heat pipe, mathematical model, numerical simulation, wastewater

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