ABSTRAK

Shell and tube heat exchanger merupakan alat penukar panas yang banyak digunakan di industri karena mampu memindahkan kalor secara efektif antara dua fluida yang memiliki perbedaan suhu. Penelitian ini bertujuan menganalisis distribusi suhu pada *shell and tube heat exchanger* menggunakan metode numerik berbasis MATLAB dengan variasi fluida panas berupa air, air glikol, dan *steam*, serta suhu masuk 60°C, 80°C, dan 100°C. Simulasi dilakukan untuk memperoleh distribusi suhu fluida panas, tube, dan fluida pendingin sepanjang pipa. Hasil penelitian menunjukkan bahwa air glikol menghasilkan perpindahan panas paling efektif. Pada suhu masuk 60°C, suhu akhir fluida panas, tube, dan fluida pendingin masing-masing sebesar 58,67°C, 57,44°C, dan 30,08°C. Pada suhu masuk 80°C, diperoleh suhu akhir sekitar 70,72°C, 67,52°C, dan 30,11°C. Sementara pada suhu masuk 100°C, suhu akhirnya sebesar 82,77°C, 77,60°C, dan 30,14°C. Hasil ini menunjukkan bahwa semakin tinggi suhu masuk fluida panas, semakin besar perpindahan kalor yang terjadi. MATLAB terbukti mampu digunakan secara efektif untuk menganalisis distribusi suhu dan performa termal *shell and tube heat exchanger*.

Kata kunci: *shell and tube heat exchanger*, MATLAB, distribusi suhu, metode numerik.

ABSTRACT

A shell and tube heat exchanger is widely used in industry due to its ability to transfer heat efficiently between two fluids at different temperatures. This study aims to analyze the temperature distribution in a shell and tube heat exchanger using a MATLAB-based numerical method with three hot fluids (water, water-glycol, and steam) and inlet temperatures of 60°C, 80°C, and 100°C. The simulation was performed to determine the temperature distribution of the hot fluid, tube, and cooling fluid.The results show that the water-glycol mixture provides the highest heat transfer performance. At an inlet temperature of 60°C, the outlet temperatures of the hot fluid, tube, and cooling fluid were 58.67°C, 57.44°C, and 30.08°C, respectively. At 80°C, the corresponding temperatures were approximately 70.72°C, 67.52°C, and 30.11°C, while at 100°C, they were 82.77°C, 77.60°C, and 30.14°C. The results indicate that increasing the inlet temperature enhances heat transfer. Furthermore, MATLAB proved to be an effective tool for analyzing the temperature distribution and thermal performance of a shell and tube heat exchanger.

Keywords: shell and tube heat exchanger, MATLAB, temperature distribution, numerical method.