Simulasi sistem kendali temperatur dan ketinggian air pada proses thermal mixing sistem multi input multi output menggunakan PID dan fuzzy logic controller = Simulation of temperature and water level control system in the thermal mixing process with a multi output multi output system using PID and fuzzy logic controller

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Abstrak

Beragam kebutuhan industri, membuat jenis-jenis proses pada industri pengolahan menjadi beragam dengan berberapa parameter input dan output, salah satunya adalah proses thermal mixing yang menggunakan sistem multi input multi output. Thermal mixing atau continuous stirred-tank reactor mengendalikan 2 aliran dengan temperatur berbeda kedalam tanki pencampur sehingga mendapat temperatur dan ketinggian tangki sesuai yang diinginkan. pada penelitian ini telah dirancang sistem pengendali berbasis logika fuzzy pada pengendalian temperatur dan level. Penelitian ini sistem logika fuzzy menngunakan 2 input dan 1 output unutk masing-masing parameter pengendalian. 2 input fuzzy set menggunakan nilai error dan change of error. Setiap fuzzy set menngunakan 7 membership function yaitu negative big (NB), negative medium (NM), negative small (NS), zero (Z), positive small (PS), positive medium (PM), dan positive big (PB). Sistem dapat melakukan pengendalian temperatur dan level sesuai yang diinginkan. Sistem ini menggunakan simulasi berbasis aplikasi MATLAB Simulink. Berdasarkan hasil simulasi, dapat disumpulkan bahwa pengendalian menggunakan fuzzy logic controller lebih baik dibandingkan pengendalian PID. Hasil pengendalian fuzzy memiliki rata-rata rise time dan settling time yang lebih cepat dan tidak memiliki overshoot.
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A variety of industrial needs, making the types of processes in the processing industry to be diverse with several input and output parameters, one of which is a thermal mixing process that uses a multi-input multi output system. Thermal mixing or continuous stirred-tank reactor controls 2 streams with different temperatures into the mixing tank so that the temperature and height of the tank are as desired. In this research a fuzzy logic based controller system has been designed for controlling temperature and level. This study uses a fuzzy logic system using 2 inputs and 1 output for each control parameter. 2 fuzzy input sets use error and change of error values. Each fuzzy set uses 7 membership functions, namely negative big (NB), negative medium (NM), negative small (NS), zero (Z), positive small (PS), positive medium (PM), and positive big (PB). The system can control the temperature and level as desired. This system uses a simulation based on the MATLAB Simulink application. Based on the simulation results, it can be concluded that the control using fuzzy logic controller is better than PID control. Fuzzy control results have a faster average rise time and settling time and do not have overshoot.