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Aerobic Bioprocess Control Using Artificial Intelligence Techniques

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Abstract : This paper deals with the design of an intelligent control structure for a bioprocess of Hansenula polymorpha yeast cultivation. The objective of the process control is to produce biomass in a desired physiological state. The work demonstrates that the designed Hybrid Control Techniques (HCT) are able to recognize specific evolution bioprocess trajectories using neural networks trained specifically for this purpose, in order to estimate the model parameters and to adjust the overall bioprocess evolution through an expert system and a fuzzy structure. The design of the control algorithm as well as its tuning through realistic simulations is presented. Taking into consideration the synergism of different paradigms like fuzzy logic, neural network, and symbolic artificial intelligence (AI), in this paper we present a real and fulfilled intelligent control architecture with application in bioprocess control.

Keywords : bioprocess, intelligent control, neural nets, fuzzy structure, hybrid techniques
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