Design of AI Controllers for Multivariable Bioprocesses

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The system uses a recursively learning fuzzy algorithm to optimizing the control of the temperature in the fermentor. Here the temperature responded in two different ways in a 7℃ set point change depending on the difference in the temperature of the ambient and the fermentor. If the set point temperature of the fermentor was different in less than 10℃ from the room temperature, the fermentor had kept the temperature within 99.90 percent of the set point in 4 minutes. Meanwhile the difference had been much greater than 10℃, the overshoot reduced to less than 0.1℃. The On−Off control for the pH in the fermentor was thought to be enough. The pH had reached in less than one minute where the set point change had been 1 pH. Since the pH sensor's response time was too long, the overshoot led to a 0.2 pH. After the overshoot the pH waved within 0.1 pH of the set point. The oscillation in a 0.1 pH is normally endurable in many bioprocesses.

In conclusion, the Fuzzy algorithm of the system presented in this work would be utilized as alternative control device for the other bioprocesses.