Simulation and Controller Tunning in a Photo-Bioreactor Applying by Taguchi Method

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Abstract : This study involves numerical simulations of a vertical plate-type photo-bioreactor to investigate the performance of Microalgae Spirulina and Control and optimization of parameters for the digital controller by Taguchi method that MATLAB software and Qualitek-4 has been made. Since the addition of parameters such as temperature, dissolved carbon dioxide, biomass, and … Some new physical parameters such as light intensity and physiological conditions like photosynthetic efficiency and light inhibitors are involved in biological processes, control is facing many challenges. Not only facilitate the commercial production photo-bioreactor Microalgae as feed for aquaculture and food supplements are efficient systems but also as a possible platform for the production of active molecules such as antibiotics or innovative anti-tumor agents, carbon dioxide removal and removal of heavy metals from wastewater is used. Digital controller is designed for controlling the light bioreactor until Microalgae growth rate and carbon dioxide concentration inside the bioreactor is investigated. The optimal values of the controller parameters of the S/N and ANOVA analysis software Qualitek-4 obtained With Reaction curve, Cohen-Con and Ziegler-Nichols method were compared. The sum of the squared error obtained for each of the control methods mentioned, the Taguchi method as the best method for controlling the light intensity was selected photo-bioreactor. This method compared to control methods listed the higher stability and a shorter interval to be answered.