

Sequential Design of Experiments via Dynamic Programming

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Most of the advanced optimization techniques currently used for microalgal bioreactor is model-based. In order to efficiently take advantage of the model, acquisition of the precise model and its parameters is crucial. Optimal experimental design is the field of study which aims at finding the most 'informative' input sequence for identifying the system, which is usually heavily time and resource consuming. We propose a further advanced methodology; a sequential design which utilizes a real-time output data for refining current estimate of the parameters and subsequent experimental design. What characterizes our approach from the usual sequential design is the fact that sampling time interval is not fixed. Unlike sequential designs with fixed sampling intervals, next sampling instant is calculated using the real-time output signal. We can save the time and resources used for sampling by focusing more on the crucial moments. Utilizing this approach, we gained the precise model parameters at a faster rate than conventional algorithms, saving plenty of time and resources used in identification step.