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# Nonlinear Model Predictive Control for Biodiesel Production via Transesterification

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**Abstract :** Biofuels have gained significant attention recently due to the new regulations and agreements regarding fossil fuels and greenhouse gases being made by countries around the globe. One of the most common types of biofuels is biodiesel, primarily made via the transesterification reaction. We model this nonlinear process in MATLAB using the standard kinetic equations. Then, a nonlinear Model predictive control (NMPC) was developed to regulate this process due to its capability to handle process constraints. The feeding flow uncertainty and kinetic disturbances are further incorporated in the model to capture the real-world operating conditions. The simulation results will show that the proposed NMPC can guarantee the final composition of fatty acid methyl esters (FAME) above the target threshold with a high chance by adjusting the process temperature and flowrate. This research will allow further understanding of NMPC under uncertainties and how to design the computational strategy for larger process with more variables.

**Keywords :** NMPC, biodiesel, uncertainties, nonlinear, MATLAB
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