Simulation and control of spray drying using nozzle atomizer spray dryer.

Abstract

Spray drying is a commonly used method of drying a liquid feed through a hot gas. This study aims to obtain the empirical model of the spray drying process of full cream milk using a nozzle atomizer spray dryer, Lab-Plant SD 05 Laboratory Scale Spray Dryer. Inlet air temperature was chosen as the manipulated variable and outlet air temperature was the controlled variable. No disturbance was considered in this process. The model was obtained from empirical model development and it can be represented using first order plus time delay (FOPTD). The empirical dynamic model of the spray drying of full cream milk was simulated using SIMULINK to evaluate the performance and robustness. The PI and PID controllers were applied to implement the control strategies of the process. The effects of parameter uncertainties were investigated. From the observation, the direct synthesis tuning method has been found as a good controller tuning for both controllers in spray drying control system.

Keyword: Spray dying; PID controller; Simulation; Process control.