

Parallel cascade control strategy for an unstable continuous bioreactor

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Parallel cascade controllers are used in the chemical and bioprocess industries to improve the dynamic performance of a control system in the presence of disturbances. In the present work, parallel cascade control strategy is applied to control a continuous bioreactor for effective control of biomass concentration using dilution rate as the manipulate variable. In order to take into account the effect of time delay that occurs usually in the primary loop of the parallel cascade control, a time delay compensator has been incorporated in the primary loop of the parallel cascade control system. The primary controller is designed using direct synthesis method. The proposed method provides robust control performances. Significant improvements in the closed loop performances are obtained with the parallel cascade control scheme over that of conventional simple feedback control system. Among parallel cascade control schemes, delay compensated scheme provides improved performances in an unstable bioreactor. This work was supported by BK21, funded by the Korea government (MEST) (KRF-2009-0076129) and funded by Seoul R&BD Program (CS070160).