Control of pH Neutralization Process using Neuro Dynamic Programming

김동규, 이광순[1], 양대륙*
고려대학교 화공생명공학과; [1]서강대학교 화공생명공학과
(dryang@korea.ac.kr*)

Traditionally, the main targets in chemical processes have been related with the petrochemical industry. According to the extension of interesting fields, because the target system became more complex and more nonlinear and it is difficult to control that with the traditional methods, the paradigm of process control has been changed. Among the numerous approaches suggested, the dynamic optimization is the most rigorous approach. But the dynamic programming approach has the curse of dimensionality problem, in order to avoid this, the Neuro-Dynamic Programming (NDP) is proposed by Bertsekas and Tsitsiklis (1996) and have been applied to the diverse areas. NDP approach is relatively new to Chemical engineering but the importance and interests of that are increased more and more. The pH neutralization process has long been taken as a representative benchmark problem of nonlinear chemical process control. In this study, NDP approach is applied to a pH neutralization process to deepen the understanding of the basic characteristics of the algorithm both in simulation and experiment. From the results, the NDP approach can be very effective if the cost-to-go function can be sufficiently represented by neural nets or other approximations.