

MODERN VISTAS OF PROCESS CONTROL

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Abstract

This paper reviews some of the most prominent and promising areas of chemical process control both in relations to batch and continuous processes. These areas include the modeling, optimization, control and monitoring of chemical processes and entire plants. Most of these areas explicitly utilize a model of the process. For this purpose the types of models used are examined in some detail. These types of models are categorized in knowledge-driven and data-driven classes. In the areas of modeling and optimization, attention is paid to batch reactors using the Tendency Modeling approach. These Tendency models consist of data- and knowledge-driven components and are often called Gray or Hybrid models. In the case of continuous processes, emphasis is placed in the closed-loop identification of a state space model and their use in Model Predictive Control nonlinear processes, such as the Fluidized Catalytic Cracking process. The effective monitoring of multivariate process is examined through the use of statistical charts obtained by the use of Principal Component Analysis (PMC). Static and dynamic charts account for the cross and auto-correlation of the substantial number of variables measured on-line. Centralized and de-centralized chart also aim in isolating the source of process disturbances so that they can be eliminated.

Even though significant progress has been made during the last decade, the challenges for the next ten years are substantial. Present progress is strongly influenced by the economical benefits industry is deriving from the use of these advanced techniques. Future progress will be further catalyzed from the harmonious collaboration of University and Industrial researchers.