Prof. Chuei-Tin Chang

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Research Interest

1. Process Synthesis and Design

Our researches are mostly concerned with the design of optimal structures for water-using networks, heat recovery and utility systems in chemical processes. In recent years, we are also interested in developing:

(1) design and maintenance strategies for control and instrumentation systems in industrial plants,

(2) process integration methods for waste minimization and cleaner production,

(3) optimal scheduling strategies for batch azeotropic distillation networks.

2. Process Safety Assessment

The main thrust of our effort is to automate several widely-adopted safety assessment procedures. We have successfully integrated FTA/FMEA/HAZOP into a digraph-based generic software. Recently, we also have developed mathematical programs for designing multi-layer protective systems with optimal maintenance schedules.

3. Fault Detection and Diagnosis

These issues are critical in enhancing operational safety in chemical plants. Our interests are diversified, e.g.

(1) the application of EKF, neural network, fuzzy logic and digraph in fault diagnosis,

(2) the synthesis of optimal alarm logics,

(3) the development of multi-variate run rules for statistical process control, etc.
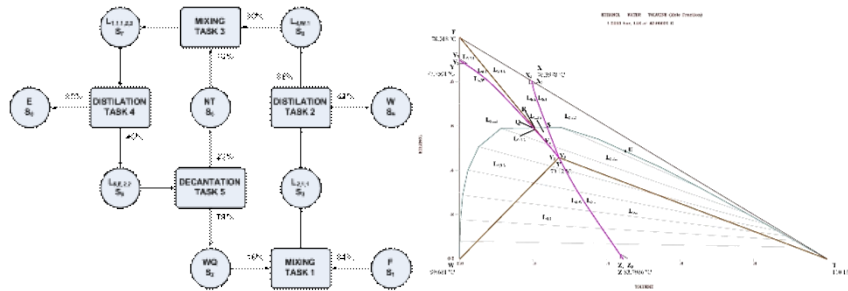
4. Batch Operation

Hardware failures are inevitable random events in operating any batch chemical plant. If fault origins are not diagnosed efficiently and accurately with online sensors, the subsequent consequences may be catastrophic. We have developed test procedures on the basis of discrete-event system (DES) theory in order to enhance failure diagnostic performance.

Representative Publications

1. Y. C. Kuo, and C. T. Chang*, 2016, "On Heuristic Computation and Application of Flexibility Indices for Unsteady Process Design," Ind. Eng. Chem. Res. 55, 670 - 682.

2. V. S. K. Adi, R. Laxmidewi, and C. T. Chang*, 2016, "An Effective Computation Strategy for Assessing Operational Flexibility of High-Dimensional Systems with Complicated Feasible Regions," Chem. Eng. Sci. 147, 137 - 149.

3. W. C. Hsieh, and C. T. Chang*, 2016, "Timed-Automata Based Method for Synthesizing Diagnostic Tests in Batch Processes," Comput. & Chem. Engng. 84, 12-27.

4. C. C. Kuo, and C. T. Chang*, 2014, "Improved Model Formulations for Multi-Period Hydrogen Network Designs," Ind. Eng. Chem Res. 53, 20204 - 20222.

5. S. L. Cheng, C. T. Chang*, and D. Jiang, 2014, "A Game-Theory Based Optimization Strategy to Configure Inter-Plant Heat Integration Schemes," Chem.Eng. Sci. 118, 60 - 7
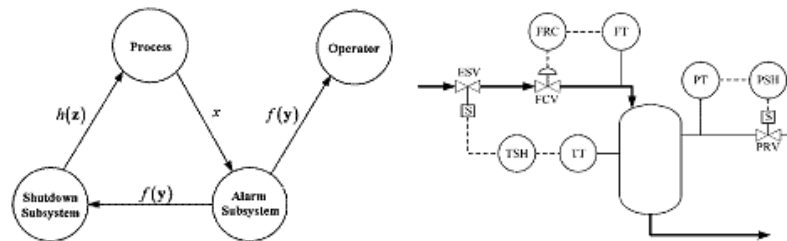
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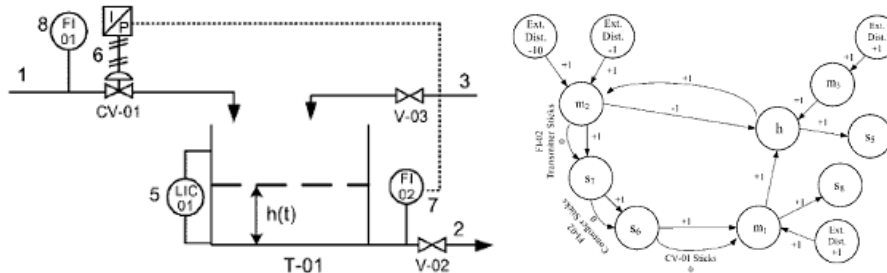
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