Prof. Shyh-Hong Hwang

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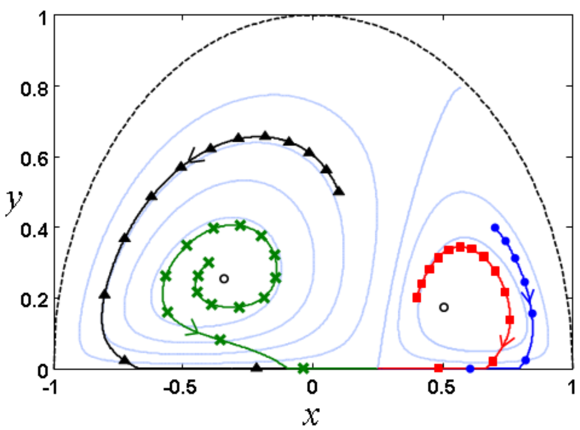
Research Interests

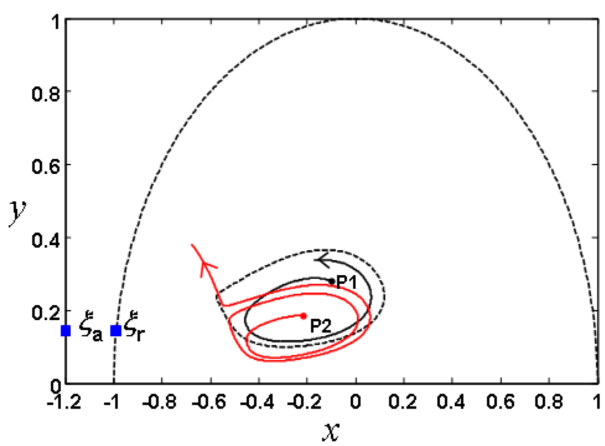
Process Control, Process Identification, Process Systems Engineering, Modeling and Control of Microfluidic Systems, Microfluidic Transport

Representative Publications

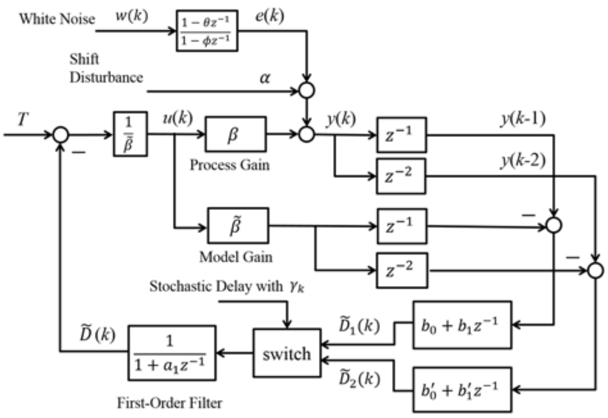
1. S. H. Hwang* and S. T. Lai, 2004, "Use of Two-Stage Least-Squares Algorithms for Identification of Continuous Systems with Time Delay Based on Pulse Responses," Automatica, 40, 1561-1568.
2. S. H. Hwang*, H. T. Chen, and C. T. Chang, 2008, "An Exponentially Weighted Moving Average Method for Identification and Monitoring of Stochastic Systems," Ind. Eng. Chem. Res., 47, 8239-8249.
3. S. J. Liu, S. H. Hwang, and H. H. Wei*, 2008, "Nonuniform Electro-Osmotic Flow on Charged Strips and Its Use in Particle Trapping," Langmuir, 24, 13776-13789.
4. H. T. Chen, S. H. Hwang*, and C. T. Chang, 2009, "Iterative Identification of Continuous-Time Hammerstein and Wiener Processes Using a Two-Stage Estimation Algorithm," Ind. Eng. Chem. Res., 48, 1495-1510.
5. S. J. Liu, H. H. Wei, S. H. Hwang*, and H. C. Chang, 2010, "Dynamic Particle Trapping, Release, and Sorting by Microvortices on a Substrate," Phys. Rev. E, 82, 026308(16).
6. S. H. Hwang*, C. Y. Hsieh, H. T. Chen, and Y. C. Huang, 2011, "Use of Discrete Laguerre Expansions for Noniterative Identification of Nonlinear Wiener Models," Ind. Eng. Chem. Res., 50, 1427-1438.
7. S. H. Hwang* and L. Chun, 2016, "Stability and Performance Analysis for Hybrid Run-to-Run Control Subject to Stochastic Metrology Delay," PSE Asia 2016, Tokyo, Japan.



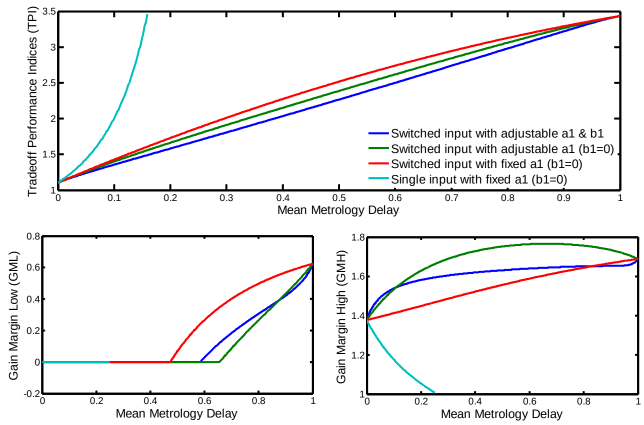
Facilitated particle trapping at the stagnation point due to an attractive non-divergence-free force from the bottom surface (Phys. Rev. E, 2010).



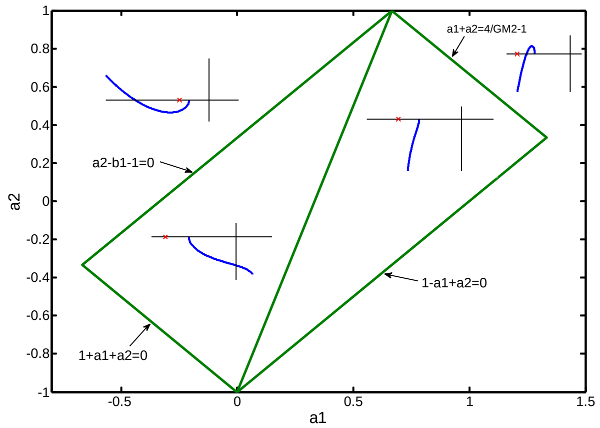
Particle sorting by mobility via a limit cycle trap in a microfluidic system (Phys. Rev. E, 2010).



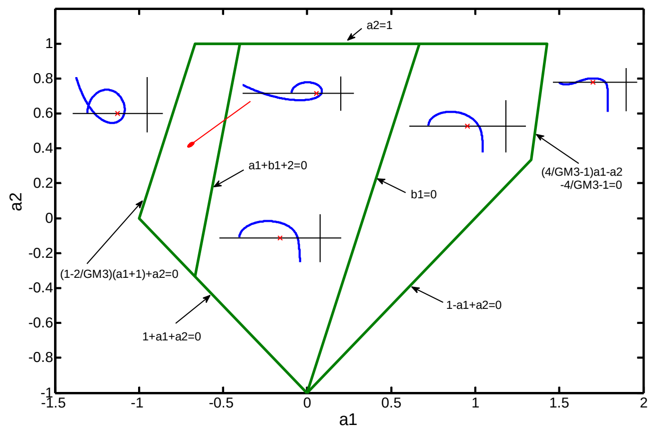
Hybrid run-to-run control subject to stochastic metrology delay in the internal model control (IMC) framework. The input of the IMC filter is switched by metrology delay.



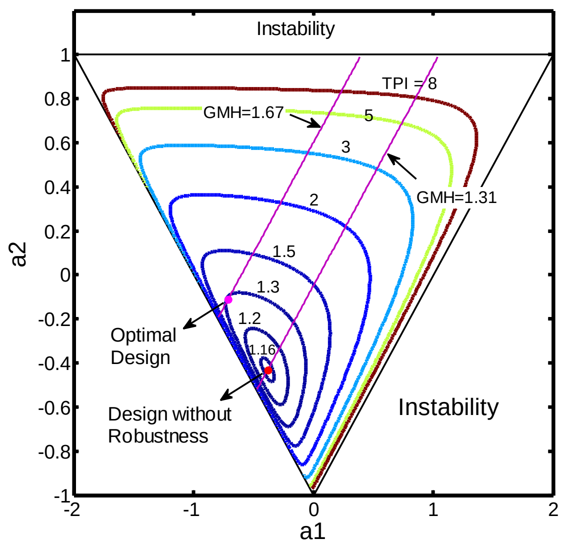
Comparison of performance and stability achieved by hybrid EWMA controllers ($\chi = 0.2828, \theta = -0.5$) with the simple controller for mean metrology delay between 0 and 1.



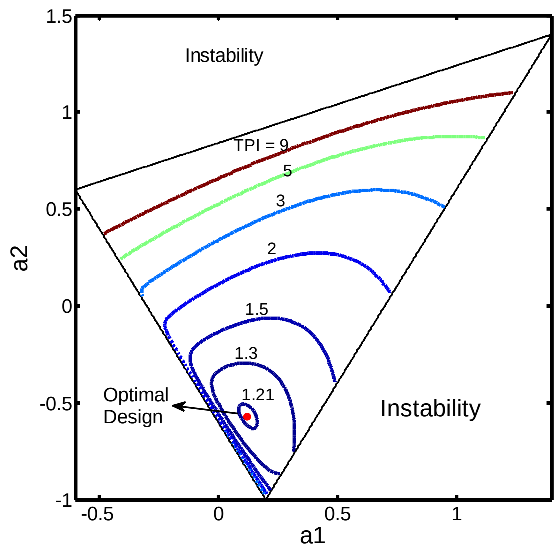
Robust stability region for run-to-run control using a second-order IMC filter. There is no metrology delay. The process is subject to a shift disturbance and GMH is specified for robust optimal design.



Robust stability region for run-to-run control using a second-order IMC filter. There is one unit of metrology delay. The process is subject to a shift disturbance and GML is specified for robust optimal design.



Robust optimal run-to-run control design based on a second-order IMC filter. The robustness requirement is $GMH \geq 1.67$. The process is subject to a drift disturbance and has no metrology delay.



Robust optimal run-to-run control design based on a third-order IMC filter. The robustness requirement is $GMH \geq 1.67$. The third-order filter yields better performance than the conventional second-order one.