

SUPPORTING INFORMATION

Simultaneous Fault Detection and Diagnosis Using Adaptive PCA and Multivariate Contribution Analysis

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Table S 1: Process model and PI controllers parameters

Parameter	Description	value
V	volume of reaction mixture in the tank	$1.0m^3$
ρ	density of reaction mixture	$10^6 g/m^3$
ρ_c	density of coolant	$10^6 g/m^3$
C_p	specific heat capacity of the mixture	$1cal/(gK)$
C_{pc}	specific heat capacity of the coolant	$1cal/(gK)$
ΔH_r	heat of reaction	$-1.3 \times 10^7 cal/kmol$
k_0	preexponential kinetic constant	$10^{10} min^{-1}$
E/R	activation energy/ideal gas constant	$8330 K$
K_T	temperature controller gain	-1.5
τ_T	temperature controller integral time	5.0
K_C	concentration controller gain	0.4825
τ_C	concentration controller integral time	2.0

Table S 2: Process variables' initial conditions, nominal values, disturbances, and noises

Variable	Initial conditions	Set points	ϕ	d	k	σ_v^2	σ_e^2
β_r	1.0		0.9			1.9×10^{-3}	
β_{UA}	1.0		0.95			9.75×10^{-4}	
T_c	$365 K$		0.2			4.75×10^{-2}	2.5×10^{-3}
T_i	$370 K$		0.2			4.75×10^{-2}	2.5×10^{-3}
F_s	$0.9 m^3/min$		0.1			1.9×10^{-2}	4.0×10^{-6}
C_a	$19.1 kmol/m^3$			2	0.25	4.75×10^{-2}	1.0×10^{-2}
C_s	$0.3 kmol/m^3$			0.2	0.2	1.875×10^{-3}	2.5×10^{-5}
F_a	$0.1 m^3/min$						4.0×10^{-6}
F_c	$15 m^3/min$						1.0×10^{-2}
C		$0.8 kmol/m^3$					2.5×10^{-5}
T		368.25 K					4.0×10^{-4}