

Quick Reference Guide



Mathematical Methods

Degrees of freedom	55
Frequency distribution	30
Frequency response	121–122
Laplace transforms	98–100
Linear operator	70
Partial fractions	107, 932
Simulation by numerical methods	83
Stability	304
Taylor Series	71
Variance	30, 221
z-transform	973

Control Algorithms

Dynamic Matrix Control (DMC)	735
Dynamic model	922, 730
Feedforward (lead/lag with dead time)	485, 493
Filter	390, 392
Internal Model Controller (IMC)	594, 595
Nonlinear proportional-integral	567
Proportional-integral-derivative (PID)	252, 366
Smith predictor	600

Block Diagrams

Block diagram algebra	116
Cascade	463
Feedforward	489
Internal Model Control (IMC)	592
Inferential control	537
Multiloop control	630
Parallel processes	152
Series processes	143
Single-loop feedback (PID)	243

Process Examples

See Appendix G for references to numerous solved examples on the following processes;	925
Distillation	
Flash Separator	
Heat Exchanger	
Non-isothermal CSTR	
Series CSTRs	
Three-tank mixer	

Controller Tuning and Empirical Modelling

Tuning goals	269
Ciancone, PID	281
Ciancone, PI	286
Digital, modification for	370
Dynamic Matrix Control (DMC)	750
Internal Model Control (IMC)	598
Level control	568
Lopez, PI	287
Multiloop PID	645
Process reaction curve	179
Statistical model fitting	188
Ziegler-Nichols, continuous cycling	330
Ziegler-Nichols, open-loop	347

Dynamic Systems

Dead time	103
First order	137
Integrator	140
Recycle	155
Second order	138
Series, interacting	151
Series, non-interacting	151

Control Design

Cascade control	461
Control Design Form (CDF)	768
Control objectives	20
Feedforward	487
Gain scheduling	518
Inferential control	542
Level control	564
Safety	794
Selecting controlled variables	216, 775
Selecting manipulated variable	217