List of Principal Notation

f_s	sampling frequency
T_s	sampling period
ω	radian frequency (rad/s)
f	frequency (Hz) or normalized frequency(f/f_s)
t	continuous time or normalized discrete-time (with respect to the sampling period t/T_s)
k	normalized discrete time (t/T_s)
$u(t)$, $y(t)$	plant input and output
$y^*(t+d+1)$	tracking reference
$r(t)$	reference or external excitation
$e(t)$	discrete time Gaussian white noise
q^{-1}	shift (delay) operator ($q^{-1}\, y(t) = y\,(t-1)$)
s, z	complex variables ($z = e^{sT}s$)
$A(q^{-1})$, $B(q^{-1})$, $C(q^{-1})$	polynomials in the variable q^{-1}
d	delay of the discrete-time system (integer)
$\hat{A}\,(t,q^{-1})$, $\hat{B}\,(t,q^{-1})$, $\hat{C}\,(t,q^{-1})$	estimation of polynomials A, B,C at instant t
$\hat{a}_i(t)$, $\hat{b}_i(t)$, $\hat{c}_i(t)$	estimated coefficients of polynomials A,B,C
$H(q^{-1})$	pulse transfer operator (discrete time systems)
$H(z^{-1})$, $H(z)$	discrete-time transfer functions
τ	time delay of a continuous-time system
$R(q^{-1})$, $S(q^{-1})$, $T(q^{-1})$	pulse transfer operators used in a RST digital controller
$S_{xy}(s)$, $S_{xy}(z^{-1})$	sensitivity functions
$P(z^{-1})$	closed loop characteristic polynomial
ΔM	modulus margin
$\Delta\tau$	delay margin
θ	parameter vector
$\hat{\theta}\,(t)$	estimated parameter vector
$\varphi(t)$, $\Phi(\tau)$	measurement / observation vector
F, $F(t)$	adaptation gain
$\varepsilon^\circ(t)$, $\varepsilon(t)$	*a priori* /*a posteriori* prediction error

$\varepsilon^{\circ}_{CL}(t)$, $\varepsilon_{CL}(t)$	closed loop *a priori* / *a posteriori* prediction error
$\upsilon^{\circ}(t)$, $\upsilon(t)$	*a priori* / *a posteriori* adaptation error
A, F	matrices
$F > 0$	positive definite matrix
t_R	rise time
t_S	settling time
M	maximum overshoot
ω_o , ζ,	natural frequency and damping factor for a continuous-time second-order system
$E\{ . \}$	expectation
MV	mean value
var.	variance
σ	standard deviation
$R(i)$	auto-correlation or cross-correlation
$RN(i)$	normalized auto-correlation or cross-correlation
t_{im}	maximum length of pulse in a PRBS
OL	open loop
CL	closed loop
BP	bandwidth
AF-CLOE	adaptive filtered closed loop output error
ARMAX	Auto-Regressive Moving Average with eXogenous input process
CLIM	closed loop input matching
CLOE	closed loop output error
CLOM	closed loop output matching
ELS	extended least squares
F-CLOE	filtered closed loop output error
GLS	generalized least squares
IVAM	instrumental variable with auxiliary model
OEAFO	output error with adaptive filtered observations
OEEPM	output error with extended prediction model
OEFC	output error with fixed compensator
OEFO	output error with filtered observations
PAA	parameter adaptation algorithm
PID	proportional + integral + derivative controller
PRBS	pseudo random binary sequence
RLS	recursive least squares
RML	recursive maximum likelihood
RST	two degrees of freedom digital controller
X-CLOE	extended closed loop output error

Warning
For sake of notation uniformity, we shall often use, in the case of linear systems with constant coefficients, q^{-1} notation both for the delay operator and the complex variable z^{-1}. The z^{-1} notation will be especially employed when an interpretation in the frequency domain is needed (in this case $z = e^{-j\omega T_s}$).