

Self-evaluation for *Digital control*

Analysis

Subject	Needs help to explain		Can explain without help	
	much	less	with a lot of effort	easily
difference equation in recursive form				
difference equation in polynomial form				
stationary gain				
frequency response				
Bode curves				
low- and high-pass filter				
poles and zeros definition				
poles influence on step response				
zeros influence on step response				
stability criteria				
solution to homogeneous difference equation				
Mikhailov curve				
stability in parameter space of 2nd order system				
Nyquist curve				
Nyquist theorem for stable systems				
amplitude- and phase margins				
Nyquist theorem for unstable systems				
block scheme algebra (transfer function from one point to another in a block scheme)				
aliasing				

Implementation

Subject	Needs help to explain		Can explain without help	
	much	less	with a lot of effort	easily
forward-difference approximation				
backward-difference approximation				
Tustin (bilinear) approximation				
PI discretization				
PID discretization				
implementation with anti-windup (how? why?)				
control structure with A-D, D-A, anti-alias filter; mark out the sampled representation				
RST-controller structure				
choice of sampling period				
role of anti-aliasing filter				
problems with too high sampling rates				
problems with too low sampling rates				

Modeling and Design

Subject	Needs help to explain		Can explain without help	
	much	less	with a lot of effort	easily
problems with design methods based on pole-zero cancellations				
equation system for pole-placement design				
integral action (why? how?)				
Ziegler-Nichols tuning experiment				
sensitivity function related to Nyquist curve				
sensitivity function related to measurement noise feedback				
fast reference response without noise sensitivity				
shaping of sensitivity functions				
time-domain constraints and dominant poles				
T-design for unity steady state gain				
signal models				
annihilation for disturbance rejection				
annihilation for reference tracking				
pre-view action design				
sampling of a system				
least-squares method for system identification				
role of data filter in system identification				
data filter for identification in closed loop				