MATLAB® FUNCTIONS

ZPK Create zero-pole-gain models or convert to zero-pole-gain format.

Creation:

SYS = ZPK(Z,P,K) creates a continuous-time zero-pole-gain (ZPK) model SYS with zeros Z, poles P, and gains K. The output SYS is a ZPK object.

SYS = ZPK(Z,P,K,Ts) creates a discrete-time ZPK model with sample time Ts (set Ts=-1 if the sample time is undetermined).

TF Creation of transfer functions or conversion to transfer function.

Creation:

SYS = TF(NUM,DEN) creates a continuous-time transfer function SYS with numerator(s) NUM and denominator(s) DEN. The output SYS is a TF object.

SYS = TF(NUM,DEN,TS) creates a discrete-time transfer function with sample time TS (set TS=-1 if the sample time is undetermined).

TFDATA Quick access to transfer function data.

[NUM,DEN] = TFDATA(SYS) returns the numerator(s) and denominator(s) of the transfer function SYS. For a transfer function with NY outputs and NU inputs, NUM and DEN are NY-by-NU cell arrays where the (I,J) entry specifies the transfer function from input J to output I. SYS is first converted to transfer function if necessary.

[NUM,DEN,TS] = TFDATA(SYS) also returns the sample time TS. Other properties of SYS can be accessed with GET or by direct structure-like referencing (e.g., SYS.Ts)

For a single SISO model SYS, the syntax

[NUM,DEN] = TFDATA(SYS,'v')

returns the numerator and denominator as row vectors rather than cell arrays.

TF2SS Transfer function to state-space conversion.

[A,B,C,D] = TF2SS(NUM,DEN) calculates the state-space representation:

$$\frac{dx}{dt} = Ax + Bu$$

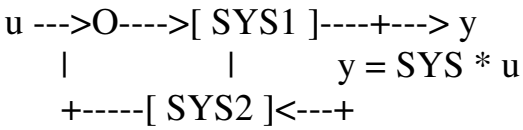
$$y = Cx + Du$$

of the system:

$$H(s) = \frac{NUM(s)}{DEN(s)}$$

FEEDBACK Feedback connection of two LTI models.

SYS = FEEDBACK(SYS1,SYS2) computes an LTI model SYS for the closed-loop feedback system



Negative feedback is assumed and the resulting system SYS maps u to y. To apply positive feedback, use the syntax SYS = FEEDBACK(SYS1,SYS2,+1).

SS Create state-space model or convert LTI model to state space.

Creation:

SYS = SS(A,B,C,D) creates a continuous-time state-space (SS) model SYS with matrices A,B,C,D. The output SYS is a SS object. You can set D=0 to mean the zero matrix of appropriate dimensions.

SYS = SS(A,B,C,D,Ts) creates a discrete-time SS model with sample time Ts (set Ts=-1 if the sample time is undetermined).

DLINMOD Obtains linear models from systems of ODEs and discrete-time systems.

Creation:

[A,B,C,D]=DLINMOD('SYS',TS) obtains a discrete-time state-space linear model (with sample time TS) of the system of mixed continuous and discrete systems described in the block diagram 'SYS' when the state variables and inputs are set to the defaults specified in the block diagram.

C2D Conversion of continuous-time models to discrete time.

SYSD = C2D(SYSC,Ts,METHOD) converts the continuous-time LTI model SYSC to a discrete-time model SYSD with sample time Ts. The string METHOD selects the discretization method among the following:

'zoh' Zero-order hold on the inputs
'foh' Linear interpolation of inputs (triangle appx.)
'tustin' Bilinear (Tustin) approximation
'prewarp' Tustin approximation with frequency prewarping. The critical frequency Wc (in rad/sec) is specified as fourth input by
SYSD = C2D(SYSC,Ts,'prewarp',Wc)
'matched' Matched pole-zero method (for SISO systems only).

The default is 'zoh' when METHOD is omitted.