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Date:28/05/19

Mathematical Operations

ABS_VALUE

Description:

Gives absolute value of the input

Parameters:

Name	Description	Value
use zero_crossing(1:yes)(0:no))	Zero crossing detection:Used to detect discontinuity within the current time step	1(One): to detect when input signal crosses zero

Properties:

Name	Description	Value
always active		no
direct-feedthrough	Output is controlled directly by input	yes
zero-crossing	Zero crossing detetction	yes
mode		yes
regular inputs		port1:size[-1/-1]/type1
regular outputs		port1:size[-1/-1]/type1
number/size of activation input		0
number/size of activation output		0
continous-time state		no
discrete-time state		no
object discrete time state		no
name of computational function		absolute _value
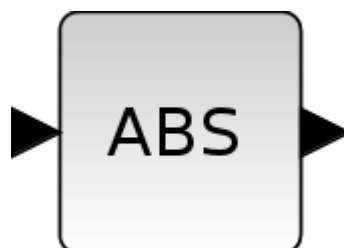
BIGSOM_f

Description:
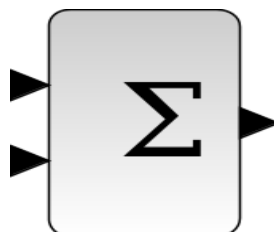
Scalar or vector Addition/Substraction.

Number Of Inputs	Operation	Description
One	$y = k*u$	Gain
Two or more	$y = k_1*u_1+k_2*u_2+...+k_n*u_N$	k_i is a vector. To substract,set a -ve value in k_i

Parameters:

Name	Description	Value
Inputs ports signs/gain	Set sign and a gain for input	[1;1]

Properties:

Name	Description	Value
always active		no
direct-feedthrough	Output is controlled directly by input	yes
zero-crossing	Zero crossing detetction	no
mode		no
regular inputs		port1:size[-1/-1]/type1
regular outputs		port1:size[-1/-1]/type1
number/size of activation input		0
number/size of activation output		0
continous-time state		no
discrete-time state		no
object discrete time state		no
name of computational function		sum

$$\Sigma$$

COSBLK_f

Description:

Cosine of input

Parameters:

NIL

Properties:

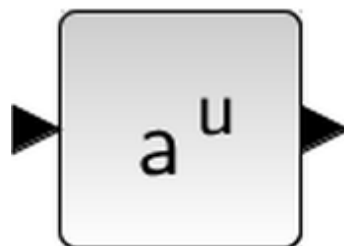| Name	Description	Value
always active		no
direct-feedthrough	Output is controlled directly by input	yes
zero-crossing	Zero crossing detetction	no
mode		no
regular inputs		port1:size[-1/-1]/type1
regular outputs		port1:size[-1/-1]/type1
number/size of activation input		0
number/size of activation output		0
continous-time state		no
discrete-time state		no
object discrete time state		no
name of computational function		cosblk
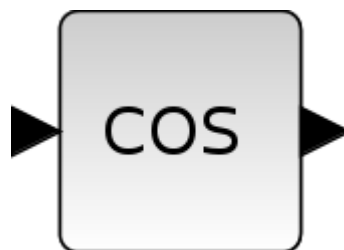
EXPBLK_m

Description:

The output of this block is a vector y with **y[i]=a^u[i]**, **a** is +ve scalar ,**u** is input vector

Parameters:

Name	Description	Value
a	Real positive scalar	A(>0)=%e

Properties:

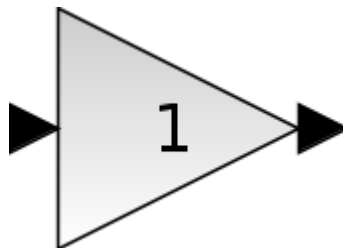| Name	Description	Value
always active		no
direct-feedthrough	Output is controlled directly by input	yes
zero-crossing	Zero crossing detetction	no
mode		no
regular inputs		port1:size[-1/-2]/type1
regular outputs		port1:size[-1/-2]/type1
number/size of activation input		0
number/size of activation output		0
continous-time state		no
discrete-time state		no
object discrete time state		no
name of computational function		expblk_m

GAINBLK_f

Description:

That blockcomputes the product of a square matrix **A** by the input vector **U**, where the number of rows/cols of A is equal to the number of rows of U. The A matrix is set with the **Gain** parameter.

Parameters:

Name	Description	Value
Gain	This parameter defined the square matrix A.	1

Properties:

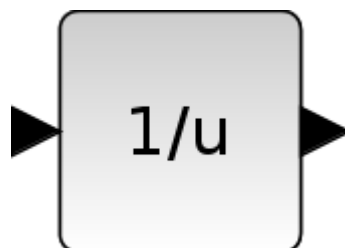| Name	Description	Value
always active		no
direct-feedthrough	Output is controlled directly by input	yes
zero-crossing	Zero crossing detetction	no
mode		no
regular inputs		port1:size[1,1]/type1
regular outputs		port1:size[1,1]/type1
number/size of activation input		0
number/size of activation output		0
continous-time state		no
discrete-time state		no
object discrete time state		no
name of computational function		gain

INVBLK

Description:

This block computes the output vector y with y[i]=1/u[i] where u is the input vector. The input and output sizes are determined by the context.

Parameters:

Name	Description	Value
Error on divide by zero	Stop when divided by zero	(1:yes) (0:no)

Properties:

| Name	Description	Value
always active		no
direct-feedthrough	Output is controlled directly by input	yes
zero-crossing	Zero crossing detetction	no
mode		no
regular inputs		port1:size[1,1]/type1
regular outputs		port1:size[1,1]/type1
number/size of activation input		0
number/size of activation output		0
continous-time state		no
discrete-time state		no
object discrete time state		no
name of computational function		invblk4

LOGBLK_f

Description:

This block computes the logarithm of the elements of the input vector. The user can fix the base with the parameter Basis. By default the block computes the natural logarithm.

Parameters:

Name	Description	Value
Basis(>1)	Real scalar greater than 1	(>1)%e

Properties:

Name	Description	Value
always active		no
direct-feedthrough	Output is controlled directly by input	yes
zero-crossing	Zero crossing detetction	no
mode		no
regular inputs		port1:size[1,1]/type1
regular outputs		port1:size[1,1]/type1
number/size of activation input		0
number/size of activation output		0
continous-time state		no
discrete-time state		no
object discrete time state		no
name of computational function		logblk
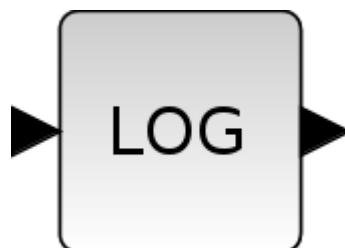
MATMAGPHI

Description:

This block computes the **magnitude and the angle of a matrix of complex numbers** or composes a matrix of complex numbers from a matrix of magnitudes and a matrix of angles.

Decomposition type	Inputs	Outputs	Operation
1	One(complex or double)	Two(double)	Complex to magnitude and radian angle
2	Two(double)	One(complex)	matrix of complex numbers built with the magnitude and the radian angle

Parameters:

Name	Description	Value
decomposition type	type of conversion	1=Complex2MAG&PHI 2=MAG&PHI2Complex

Properties:

Name	Description	Value
always active		no
direct-feedthrough	Output is controlled directly by input	yes
zero-crossing	Zero crossing detetction	no
mode		no
regular inputs		port1:size[-1,-2]/type2
regular outputs		port1:size[-1,-2]/type1 port2:size[-1,-2]/type1
number/size of activation input		0
number/size of activation output		0
continous-time state		no
discrete-time state		no
object discrete time state		no
name of computational function		matz_abs

MATZREIM

Description:

This block decomposes a matrix of complex numbers by separating **the real and imaginary** parts or composes a matrix of complex numbers by joining the two parts with respect to the value of decomposition type parameter.

Decomposition type	Inputs	Outputs	Operation
1	One(complex)	Two(double)	Decomposition
2	Two(double)	One(complex)	Composition

Decomposition:The real part and the imaginary part of the input are available respectively on the first and the second outputs.
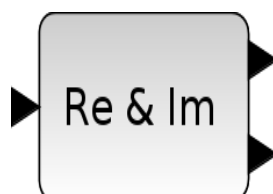**Composition**: The output is a matrix of complex numbers built with the real and imaginary parts coming respectively from the first and from the second inputs.

Parameters:

Name	Description	Value
decomposition type	type of conversion	1=Complex2Real&Imag 2=real&Imag2Complex

Properties:

Name	Description	Value
always active		no
direct-feedthrough	Output is controlled directly by input	yes
zero-crossing	Zero crossing detetction	no
mode		no
regular inputs		port1:size[-1,-2]/type2
regular outputs		port1:size[-1,-2]/type1 port2:size[-1,-2]/type1
number/size of activation input		0
number/size of activation output		0
continous-time state		no
discrete-time state		no
object discrete time state		no
name of computational function		matz_reim

MAXMIN

Description:

This block computes the logarithm of the elements of the input vector. The user can fix the base with the parameter Basis. By default the block computes the natural logarithm.

Parameters:

Name	Description	Value
Min(1) or Max(2)	The function to apply to input	Min(1) Max(2)
Nimber of input vectors	Number of inputs	1 or 2
use zero_crossing(1:yes)(0:no))	Zero crossing detection:Used to detect discontinuity within the current time step	1(One): to detect when input signal crosses zero

Properties:

Name	Description	Value
always active		no
direct-feedthrough	Output is controlled directly by input	yes
zero-crossing	Zero crossing detetction	no
mode		no
regular inputs		port1:size[-1,1]/type1
regular outputs		port1:size[1,1]/type1
number/size of activation input		0
number/size of activation output		0
continous-time state		no
discrete-time state		no
object discrete time state		no
name of computational function		minmax

MAX_f

Description:

Maximum value of elements of input vector

Parameters:

NIL

Properties:

Name	Description	Value
always active		no
direct-feedthrough	Output is controlled directly by input	yes
zero-crossing	Zero crossing detetction	no
mode		no
regular inputs		port1:size[-1,1]/type1
regular outputs		port1:size[1,1]/type1
number/size of activation input		0
number/size of activation output		0
continous-time state		no
discrete-time state		no
object discrete time state		no
name of computational function		maxblk

MIN_f

Description:

Minimum value of elements of input vector

Parameters:

NIL

Properties:

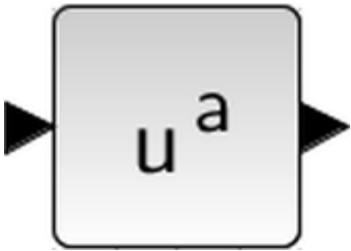| Name	Description	Value
always active		no
direct-feedthrough	Output is controlled directly by input	yes
zero-crossing	Zero crossing detetction	no
mode		no
regular inputs		port1:size[-1,1]/type1
regular outputs		port1:size[1,1]/type1
number/size of activation input		0
number/size of activation output		0
continous-time state		no
discrete-time state		no
object discrete time state		no
name of computational function		maxblk

POWBLK_f

Description:

This block computes an output vector y with **y[i]= u[i]^a** where a is the real scalar given by the parameter to the power of and u the input.

Parameters:

Name	Description	Value
a	Real,scalar,exponent value	%e

Properties:

Name	Description	Value
always active		no
direct-feedthrough	Output is controlled directly by input	yes
zero-crossing	Zero crossing detetction	no
mode		no
regular inputs		port1:size[-1,1]/type1
regular outputs		port1:size[-1,1]/type1
number/size of activation input		0
number/size of activation output		0
continous-time state		no
discrete-time state		no
object discrete time state		no
name of computational function		powblk

u^a

PRODUCT

Description:

That block computes element-wise multiplication or division of its vector inputs. The number of inputs and operation are specified with the **Number of inputs** or **sign vector** parameter.
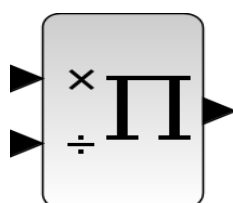
- To multiply all the inputs between them, set this parameter to the number of inputs.

- To multiply/divide the input ui, set in this parameter a vector k with $k_{[i]} = +1$ (multiply) or -1 (divide) for the input u_i.

Parameters:

Name	Description	Value
Number of inputs or sign vector	Set the number of inputs and the associated operation	1=Multiplication -1=Division
Error on divide by zero	Stop when divided by zero	(1:yes) (0:no)

Properties:

Name	Description	Value
always active		no
direct-feedthrough	Output is controlled directly by input	yes
zero-crossing	Zero crossing detetction	no
mode		no
regular inputs		port1:size[-1,1]/type1 port2:size[-1,1]/type1
regular outputs		port1:size[-1,1]/type1
number/size of activation input		0
number/size of activation output		0
continous-time state		no
discrete-time state		no
object discrete time state		no
name of computational function		product

PROD_f

Description:

- The output of that block is the element-wise product of its two input vectors. •

Parameters:

NIL

Properties:

Name	Description	Value
always active		no
direct-feedthrough	Output is controlled directly by input	yes
zero-crossing	Zero crossing detetction	no
mode		no
regular inputs		port1:size[-1,1]/type1 port2:size[-1,1]/type1
regular outputs		port1:size[-1,1]/type1
number/size of activation input		0
number/size of activation output		0
continous-time state		no
discrete-time state		no
object discrete time state		no
name of computational function		prod

SIGNUM

Description:

The block output is a vector of the signs of the elements of the input vector. For each input vector's element, the output vector's element is:
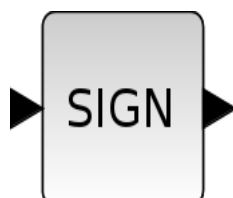
- 1 when the element is greater than zero.

- 0 when the element is equal to zero.

- -1 when the element is less than zero.

Parameters:

Name	Description	Value
use zero_crossing(1:yes)(0:no))	Zero crossing detection:Used to detect discontinuity within the current time step	1(One): to detect when input signal crosses zero

Properties:

Name	Description	Value
always active		no
direct-feedthrough	Output is controlled directly by input	yes
zero-crossing	Zero crossing detetction	no
mode		no
regular inputs		port1:size[-1,1]/type1
regular outputs		port1:size[-1,1]/type1
number/size of activation input		0
number/size of activation output		0
continous-time state		no
discrete-time state		no
object discrete time state		no
name of computational function		signum

SINBLK_f

Description:

Sine of input

Parameters:

NIL

Properties:

Name	Description	Value
always active		no
direct-feedthrough	Output is controlled directly by input	yes
zero-crossing	Zero crossing detetction	no
mode		no
regular inputs		port1:size[-1/-1]/type1
regular outputs		port1:size[-1/-1]/type1
number/size of activation input		0
number/size of activation output		0
continous-time state		no
discrete-time state		no
object discrete time state		no
name of computational function		sinblk

SQRT

Description:

This block computes the square root of each element of the input matrix

Parameters:

Name	Description	Value
Datatype	It indicates the type of the output	1=real double 2=Complex

Properties:

Name	Description	Value
always active		no
direct-feedthrough	Output is controlled directly by input	yes
zero-crossing	Zero crossing detetction	no
mode		no
regular inputs		port1:size[-1,-2]/type1
regular outputs		port1:size[-1,-2]/type1
number/size of activation input		0
number/size of activation output		0
continous-time state		no
discrete-time state		no
object discrete time state		no
name of computational function		mat_sqrt

SUMMATION

Description:

Scalar or vector Addition/Substraction.

Number Of Inputs	Operation	Description
One	$y = (+/-)u$	Gain
One	$y = u_1+u_2+...+u_N$	u is vector or matrix
Two or more	$y = k_1*u_1+k_2*u_2+...+k_n*u_N$	k_i is a vector. To substract,set a -ve value in k_i

Parameters:

Name	Description	Value
Inputs ports signs/gain	Set sign and a gain for input	[1;1]
Datatype	It indicates the type of the input/output data	1=real double 2=complex 3=int32
Do on Overflow		0=nothing 1=saturate 2=error

Properties:

Name	Description	Value
always active		no
direct-feedthrough	Output is controlled directly by input	yes
zero-crossing	Zero crossing detetction	no
mode		no
regular inputs		port1:size[-1/-2]/type1 port2size[-1/-2]/type1
regular outputs		port1:size[-1/-2]/type1
number/size of activation input		0
number/size of activation output		0
continous-time state		no
discrete-time state		no
object discrete time state		no
name of computational function		summation
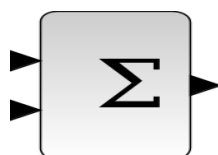
SUM_f

Description:

Addition

Parameters:

NIL

Properties:

Name	Description	Value
always active		no
direct-feedthrough	Output is controlled directly by input	yes
zero-crossing	Zero crossing detetction	no
mode		no
regular inputs		port1:size[-1/-1]/type1 port2:size[-1/-1]/type0 port3:size[-1/-1]/type1
regular outputs		port1:size[-1/-1]/type1
number/size of activation input		0
number/size of activation output		0
continous-time state		no
discrete-time state		no
object discrete time state		no
name of computational function		plusblk
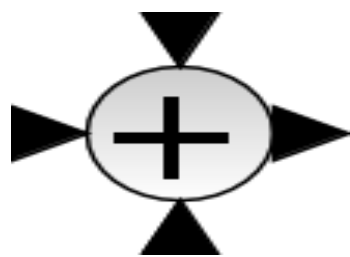
TANBLK_f

Description:

Tangent of input

Parameters:

NIL

Properties:

Name	Description	Value
always active		no
direct-feedthrough	Output is controlled directly by input	yes
zero-crossing	Zero crossing detetction	no
mode		no
regular inputs		port1:size[-1/1]/type1
regular outputs		port1:size[-1/1]/type1
number/size of activation input		0
number/size of activation output		0
continous-time state		no
discrete-time state		no
object discrete time state		no
name of computational function		tanblk
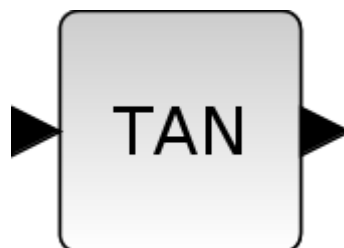
TrigFun

Description:

Trignometric Functions

Function	Definition	Output
sin	Sine of input	y=sin(u)
cos	Cosine of input	y=cos(u)
tan	Tangent of input	y=tan(u)
asin	Inverse sine	y=asin(u)
acos	Inverse Cosine	y=acos(u)
atan	Inverse tangent	y=atan(u)
sinh	Hyperbolic sine	y=sinh(u)
cosh	Hyperbolic cosine	y=cosh(u)
tanh	Hyperbolic tangent	y=tanh(u)

Parameters:

Name	Description	Value
Function	Trigonometric function	Sin,cos,tan,asin,acos,atan,sinh, cosh,tanh,asinh,acosh,atanh

Properties:

Name	Description	Value
always active		no
direct-feedthrough	Output is controlled directly by input	yes
zero-crossing	Zero crossing detetction	no
mode		no
regular inputs		port1:size[-1/1]/type1
regular outputs		port1:size[-1/1]/type1
number/size of activation input		0
number/size of activation output		0
continous-time state		no
discrete-time state		no
object discrete time state		no
name of computational function		sin_blk

sin	cos	tan
asin	acos	atan
sinh	cosh	tanh
asinh	acosh	atanh

atanh