The List of Commands
Polynomial Toolbox 2.0

GLOBAL STRUCTURE

gensym	Set global variable symbol for polynomial matrices.
gprop	Set/modify global polynomial properties.
pformat	Set output format.
pinit	Initialize the Polynomial Toolbox.
checkpb	Check conflicts of Polynomial toolbox variables.
pver	Polynomial Toolbox version information.
pversion	Polynomial Toolbox version number.
tolerance	Set global relative tolerance.
userdata	Set or return user data of polynomial object.
verbose	Set global verbose level

POLYNOMIAL MATRIX OBJECT

deg	Extract various degrees of polynomial matrix.
lcoef	Extract various leading coefficient matrices.
lop	Create a polynomial matrix object.
pol	Create a polynomial matrix object.
pprop	Set/modify properties of polynomial matrix.
symbol	Set/return variable symbol of polynomial matrix.

CONVERTORS

bhf	Convert realization (A,B,C) into upper Hessenberg form.
bhf2rmf	Convert realization into a right coprime Polynomial Matrix Fraction.
dsp2pol	Conversion from DSP format to Polynomial Toolbox format.
dss2lmf	Descriptor state space to left Polynomial Matrix Fraction.
dss2rmf	Descriptor state space to right Polynomial Matrix Fraction.
dss2ss	Descriptor system to State Space system.
dssreg	Regularization of a standard descriptor plant.
lmf2dss	Left polynomial matrix fraction to descriptor state space.
lmf2rat	Left fraction to polynomial numerator and denominator matrices.
lmf2rmf	Left-to-Reft conversion of Polynomial Matrix Fraction.
lmf2ss	Left Polynomial Matrix Fraction to Observer-form realization (A,B,C,D).
lmf2tf	LMF to Control System Toolbox transfer function.
lmf2zpk	LMF to Control System Toolbox zero-pole-gain.
lti2lmf	LTI object to Left Polynomial Matrix Fraction.
lti2rmf	LTI object to Right Polynomial Matrix Fraction.
mat2pol	Conversion from Matlab format to Polynomial Toolbox format.
new2old	Conversion to old polynomial matrix format.
old2new	Conversion from old polynomial format to new.
pol2dsp	Conversion from Polynomial Toolbox format to DSP format.
pol2mat	Conversion from Polynomial Toolbox format to Matlab format.
pol2root	Extract zeros and gains of polynomial matrix.
rat2lmf	Polynomial numerator and denominator matrices to left PMF.
rat2rmf	Polynimial numerator and denominator matrices to right PMF.
reverse	Reverse the variable of Polynomial Matrix Fraction.
rmf2dss	Right Polynomial Matrix Fraction to descriptor state space.
rmf2lmf	Right-to-Left conversion of Polynomial Matrix Fraction.
rmf2rat	Right PMF to polynomial numerator and denominator matrices.
rmf2ss	RMF to Controller-form realization (A,B,C,D).
rmf2tf	RMF to Control System Toolbox transfer function.
rmf2zpk	RMF to Control System Toolbox zero-pole-gain.
root2pol	Construct polynomial matrix from its zeros and gains.
ss	LMF or RMF to LTI object in state space form.
ss2dss	State space to Descriptor State Space.
ss2lmf	State space to left matrix fraction conversion.
ss2rmf	State space to right matrix fraction conversion.
sym	Conversion from polynomial matrix to symbolic format.
tf	LMF or RMF to LTI object in transfer function form.
tf2lmf	Control System Toolbox Transfer Function to LMF.
tf2rmf	Control System Toolbox Transfer Function to RMF.
zpk	LMF or RMF to LTI object in zero-pole-gain-form.
zpk2lmf	Zero-pole-gain to left matrix fraction.
zpk2rmf	Zero-pole-gain to right matrix fraction.

OVERLOADED OPERATIONS

char	Convert a polynomial object to cell array of strings.
ctranspose (')	Conjugate transposition.
display	Command window display of polynomial matrix.
eq	Equality test for polynomial matrices.
fliplr	Flip a polynomial matrix in left/right direction.
flipud	Flip a polynomial matrix in up/down direction.
horzcat ([,])	Horizontal concatenation of polynomial matrices.
kron	Kronecker tensor product of polynomial matrices.
ldivide (.\)	Left polynomial array divide.
minus (-)	Binary subtraction of polynomial matrices.
mldivide (\)	Backslash or left polynomial matrix divide.
mpower (^)	Matrix power for polynomial matrix.
mrdivide (/)	Slash or right polynomial matrix divide.
mtimes (*)	Matrix multiplication of polynomial matrices.
ne	Inequality test for polynomial matrices.
plus (+)	Binary addition of polynomial matrices.
power (.^)	Element-wise power for polynomial matrix.
rdivide (./)	Right array divide.
subsasgn	Subscripted assignment for polynomial matrix.
subsref	Subscripted reference for polynomial matrix.
times (.*)	Element-wise multiplication.
transpose (.')	Matrix transposition.
uminus	Unary minus of polynomial matrix.
uplus	Unary plus of polynomial matrix.
vertcat ([;])	Vertical concatenation of polynomial matrices.

OVERLOADED FUNCTIONS

compan	Block companion matrix.
conj	Polynomial matrix complex conjugate.
det	Compute determinant of square polynomial matrix.
det2d	Determinant of 2-D polynomial matrix.
diag	Extract diagonals and create diagonal matrices.
imag	Imaginary part of polynomial matrix.
inv	Inverse of a polynomial matrix.
isempty	True for empty polynomial matrix.
isfinite	True for finite elements in polynomial matrix.
isinf	True for infinite elements in polynomial matrix.
isnan	True for Not-a-Number in polynomial matrix.
isprime	True for left or right prime polynomial matrix.
isreal	True for real polynomial matrix.
length	Length of vector.
lu	LU factorization for polynomial matrices.
norm	Polynomial matrix norms.
null	Null space of a polynomial matrix.
pinv	Pseudoinverse of polynomial matrix.

polyval	Evaluate a polynomial matrix.
prod	Product of elements of polynomial matrix.
rank	Polynomial matrix rank.
real	Real part of polynomial matrix.
roots	Find polynomial matrix roots.
rot90	Rotate polynomial matrix 90 degrees.
shift	Shift polynomial matrix.
size	Polynomial matrix dimensions.
sum	Sum of elements of polynomial matrix.
sylv	Create Sylvester matrix of a polynomial matrix.
trace	Sum of diagonal elements of a polynomial matrix.
tril	Extract lower triangular part of polynomial matrix.
triu	Extract upper triangular part of polynomial matrix.

BASIC FUNCTIONS (other than overloaded)

adj	Adjoint of square polynomial matrix.
charact	Characteristic vectors of a polynomial matrix.
evenpart	Return the even part of a polynomial object.
hurwitz	Create Hurwitz matrix of polynomial objects.
inertia	Inertia of a polynomial matrix.
isfullrank	True if polynomial matrix has full rank.
isproper	True if polynomial matrix fraction is proper.
issingular	True if polynomial matrix is singular.
isstable	True if polynomial matrix is stable.
isunimod	True if polynomial matrix is unimodular.
kharit	Create Kharitonov polynomials.
gram	Gramian of polynomial matrix fraction.
h2norm	H2 norm of a polynomial matrix fraction.
hinfnorm	H-infinity norm of a polynomial matrix fraction.
linvt	Linear transform of variable.
longldiv	Long left polynomial matrix division.
longrdiv	Long right polynomial matrix division.
oddpart	Return the odd part of a polynomial object.
polfit	Fit polynomial matrix element-by-element to data.
polpart	Polynomial matrix symmetric part extraction.
polyder	Derivative of a polynomial matrix.
prand	Generates polynomial matrix with random coefficients.
ptopex	Extreme polynomials for a polytype of polynomials.
pzer	Perform zeroing on a polynomial matrix.
scale	Scale a polynomial matrix.

ADVANCED OPERATIONS

gld	Greatest left divisor of polynomial matrices.
grd	Greatest right divisor of polynomial matrices.
ldiv	Left polynomial matrix division.
llm	Least left multiple of polynomial matrices.
lrm	Least right multiple of polynomial matrices.
minbasis	Minimal polynomial basis.
rdiv	Right polynomial matrix division.
stabint	Stability interval of uncertain polynomial matrices.

SPECIAL MATRICES

d,p,q,s,v,z,zi	Create simple basic monomials.
mono	Create monomial matrix(vector) in current global variable.

MATRIX PENCIL ROUTINES

clements	Conversion to Clements standard form.
pencan	Conversion to real Kronecker canonical form.
plyap	Solution of the pencil equation A*X+Y*B=C.

NUMERICAL ROUTINES

cgivens1	Calculates Givens rotation.
qzord	Ordered qz transformation.
schurst	Ordered complex Schur decomposition of a matrix.

CANONICAL AND REDUCED FORMS

colred	Column reduced form of a polynomial matrix.
diagred	Diagonal reduced form of a polynomial matrix.
echelon	Echelon form of a polynomial matrix.
hermite	Hermite form of a polynomial matrix.
pdg	Diagonalization of a polynomial matrix.
rowred	Row reduced form of a polynomial matrix.
smith	Smith form of a polynomial object.
tri	Triangular or staircase form of a polynomial matrix.

CONTROL ROUTINES

debe	Deadbeat controllers of discrete-time linear systems.
dsshinf	H-inf suboptimal compensator for descriptor systems.
dssmin	Minimize dimension of pseudo state descriptor system.
dssrch	Search Optimal Solution descriptor H-inf problem.
mixeds	Solution SISO mixed sensitivity problem.
plqg	Polynomial solution of a MIMO LQG problem.
pplace	Polynomial pole placement.
splqg	Polynomial solution of a SISO LQG problem.
stab	Stabilizing controllers of linear systems.

EQUATION SOLVERS

axb	Solution of AX = B.
axbc	Solution of AXB = C.
axbyc	Solution of AX + BY = C.
axxab	Solution of A'X + X'A = B.
axyab	Solution of A'X + Y'A = B.
axybc	Solution of AX + YB = C.
xaaxb	Solution of XA' + AX' = B.
xab	Solution of XA = B.
xaybc	Solution of XA + YB = C.

FACTORIZATIONS

fact	Polynomial matrix factor extraction.
spcof	Polynomial J-spectral co-factorization.
spf	Polynomial spectral factorization.

SIMULINK

polblock	Simulink mdl-file.

VISUALISATION

khplot	Plot of Kharitonov rectangles for interval polynomials.
pplot	2-D plot of polynomial matrix.
pplot3	3-D plot of polynomial matrix.
ptopplot	Plots polygonal values set for polytype of polynomials.
zpplot	Plot of zero-pole map.

GRAPHIC USER INTERFACE

pme	Polynomial Matrix Editor.

DEMONSTRATIONS AND HELPS

covf	Covariance function of an ARMA process.
demoB	Script file for the demo "Control of a batch process".
demoM	Script file for the demo "Polynomial solution of the SISO mixed sensitivity H-infinity problem".
minsens	Minimum peak sensitivity.
poldemo	Run Polynomial Toolbox demonstrations.
poldesk	Comprehensive hypertext documentation.