New Dislin Features since Version 11.0

This article describes new features and options of Dislin which are added to the software since version 11.0 and not covered by the current Dislin book version 11. The current version number of Dislin is 11.2.1

Chapter 4: Plotting Axis Systems and Titles

G R A F R

The routine GRAFR plots a two-dimensional axis system for a Smith chart, where the non negative impedance or admittance plane is projected to a complex reflexion coefficient plane, which is displayed in the unity radius region. The projection is done by the formula r = (z - 1) / (z + 1), where z and r are complex numbers.

The call is:	CALL GRAFR (XRAY, N, YRAY, M)	level 1
or:	void grafr (const float *xray, int n, const float *yray, int m);	
XRAY	is an array of non negative real values of complex impedance data. The values are plotted as labels at the X-axis.	
N	is the dimension of XRAY.	
YRAY	is an array of imaginary values of complex impedance data. The values are plotted as labels at the Y-axis (unity circle).	
M	is the dimension of YRAY.	

Additional notes:
- The conversion routine GETRCO calculates the reflection factor r for a impedance z by the formula r = (z - 1) / (z + 1). The reverse transformation z = (1 + r) / (1 - r) is done by GETICO.
- Additional grid lines in a Smith chart can be plotted with the routines GRIDRE and GRIDIM.
- A similar axis system for a Smith chart can be created with the normal GRAF routine, where the scaling is defined from -1.0 to 1.0 for both axes. For that case, values must be converted by GETRCO to reflection factors before passing them to plot routines. For GRAFR, this is done automatically in plot routines.

G R I D R E

GRIDRE plots a grid line of a constant real part in a Smith chart.

The call is:	CALL GRIDRE (ZRE, ZIMG1, ZIMG2, N)	level 2
or:	void gridre (float zre, float zimg1, float zimg2, int n);	
ZRE	is the constant real value of the grid line ($\geq$ 0.0).	
ZIMG1, ZIMG2	are the start and end imaginary parts of the gird line.	
N	is the resolution of the curve, which means the number of generated points between ZIMG1 and ZIMG2.	

G R I D I M

GRIDIM plots a grid line of a constant imaginary part in a Smith chart.

The call is:	CALL GRIDIM (ZIMG, ZRE1, ZRE2, N)	level 2
or:	void gridim (float zimg, float zre1, float zre2, int n);	
ZIMG	is the constant imaginary value of the grid line.	
ZRE1, ZRE2	are the start and end real parts of the gird line ($\geq$ 0.0).	
N	is the resolution of the curve.	

Example:

The Fortran program

```
      PROGRAM SMITH
      PARAMETER(N=1000, M=1000)
      DIMENSION X(N),Y(N),ZIMG(11),ZRE(5)
      DATA ZIMG/5.0, 2.0, 1.0, 0.5, 0.2, 0.0, -0.2, -0.5,
     *          -1.0, -2.0, -5.0/
      DATA ZRE/0.2, 0.5, 1.0, 2.0, 5.0/

      STEP = (50.0 + 50.0) / (N - 1)
      DO I=1,N
        X(I) = 1.0
        Y(I) = -50.0 + I * STEP
      END DO

      CALL METAFL ('PDF')
      CALL DISINI ()
      CALL HWFONT ()
      CALL NAME ('X-axis', 'X')
      CALL NAME ('Y-axis', 'Y')
      CALL LABTYP ('HORI', 'POLAR')
      CALL LABTYP ('VERT', 'X')
      CALL GRAFR (ZRE, 5, ZIMG, 11)

      CALL GRIDRE (1.0, -50.0, 50.0, M)
      CALL GRIDRE (2.0, -50.0, 50.0, M)
      CALL GRIDRE (3.0, -50.0, 50.0, M)
      CALL GRIDRE (4.0, -50.0, 50.0, M)
      CALL GRIDRE (5.0, -50.0, 50.0, M)

      CALL GRIDIM (0.5, 0.001, 50.0, M)
      CALL GRIDIM (1.0, 0.001,  1.0, M)
      CALL GRIDIM (2.0, 0.001, 50.0, M)
      CALL GRIDIM (3.0, 0.001, 50.0, M)
      CALL GRIDIM (4.0, 0.001, 50.0, M)
      CALL GRIDIM (5.0, 0.001, 50.0, M)

      CALL CURVE (X, Y, N)
      CALL DISFIN ()
      END
```

produces the following figure:

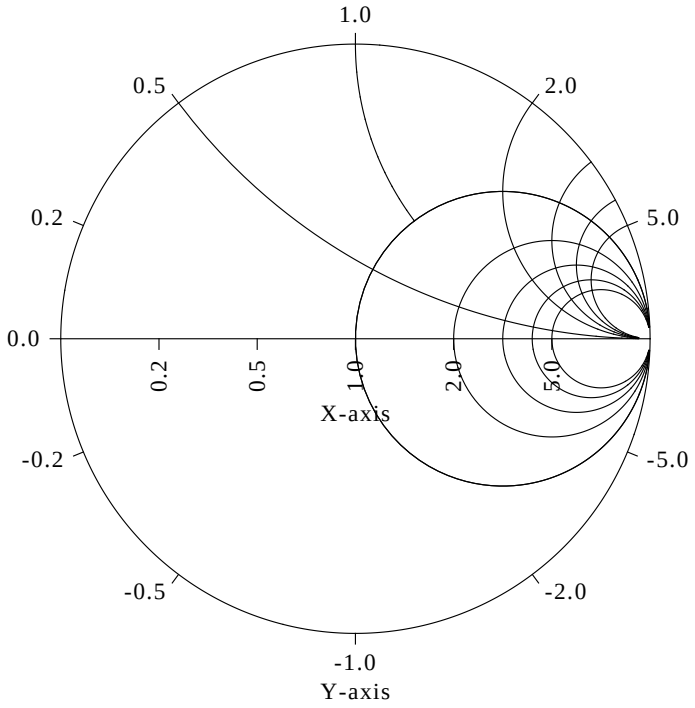

Figure 4.1: Smith Plot

Chapter 5: Plotting Curves

L I N F I T

LINFIT plots a straight line that has the best fit to a series of data points.

The call is:	CALL LINFIT (XRAY, YRAY, N, A, B, R, COPT)	level 2, 3
or:	void linfit (const float *xray, const float yray, int n, float *a, float *b, float *r, const char *copt);	
XRAY, YRAY	are arrays that contain X- and Y-coordinates.	
N	the number of data points.	
A, B	are the returned values of the calculated line Y = A * X + B.	
R	is the returned correlation coefficient of the fit between -1.0 and 1.0. A value around zero means no correlation, a value near -1.0 or 1.0 means good correlation.	
COPT	is a character string that can have the values 'NONE', 'ALL' and 'LINE'. 'NONE' means that just the values A, B and R are calculated. Nothing is plotted. For that case LINFIT can also be called in the levels 0 and 1. 'LINE' means that the straight line is plotted and 'ALL' that the straight line and the data points are plotted.	

Chapter 6: Parameter Setting Routines

G A P S I Z

The 'Z' option is added to GAPSIZ for enabling gaps in 3D curves.

The following mathematical symbols are added to the LaTeX symbols:

\approx	\leqslant	\qeqslant	\nless	\ngtr	\nleq	\ngeq
\nlegslant	\ngeqslant	\prec	\succ	\nprec	\nsucc	\preceq
\succeq	\npreceq	\nsucceq	\ll	\gg	\lll	
\ggg	\nsubseteq	\nsupseteq	\sqsubset	\sqsupset	\sqsubseteq	
\sqsupseteq	\doteq	\simeq	\propto	\angle	\measuredangle	
\circ	\sphericalangle					

Chapter 9: Utility Routines

G E T R C O

GETRCO converts a complex impedance value to a reflection factor by the formula r = (z - 1) / (z + 1).

The call is:	CALL GETRCO (ZRE, ZIMG, RRE, RIMG)	level 0, 1, 2, 3
or:	void getrco (float zre, float zimg, float *rre, float *rimg);	
ZRE, ZIMG	are the real and imaginary parts of z.	
RRE, RIMG	are the returned real and imaginary parts of r.	

G E T I C O

GETICO converts a complex reflection factor to an impedance by the formula z = (1 + r) / (1 - r).

The call is:	CALL GETICO (RRE, RIMG, ZRE, ZIMG)	level 0, 1, 2, 3
or:	void getico (float rre, float rimg, float *zre, float *zimg);	
RRE, RIMG	are the real and imaginary parts of r.	
ZRE, ZIMG	are the returned real and imaginary parts of	

C S R P O L

CSRPOL is a similar routine to CSRPTS. It returns an array of mouse positions, where help lines are plotted between the points. CSRPOL is waiting for mouse button 1 clicks and terminates if mouse button 2 is pressed.

The call is:	CALL CSRPOL (NXRAY, NYRAY, NMAX, N, IRET)	level 1, 2, 3
or:	void csrpol (int *nxray, int *nyray, int nmax, int *n, int *iret);	
NXRAY, NYRAY	are the returned coordinates of the collected mouse positions.	
NMAX	is the dimension of NXRAY and NYRAY and defines the maximal number of points that will be stored in NXRAY and NYRAY.	

N — is the number of points that are returned in NXRAY and NYRAY.

IRET — is a returned status. IRET not equal 0 means that not all mouse movements could be stored in NXRAY and NYRAY.

Chapter 12: 3-D Graphics

G R F I M G

The routine GRFIMG includes a PNG, BMP, TIFF or GIF file into a 3-D plane defined by GRFINI. This routine can only be used if the output format is a raster format (screen or image file).

The call is: CALL GRFIMG (CFIL) — level 1, 2, 3

or: void grfimg (char *cfil);

CFIL — is a character string that contains the filename.

S E T R E S 3 D

The routine SETRES3D sets the symbol size for the 3-D symbol with the number 0 (cube) plotted by SYMB3D, CURV3D and CURV4D.

The call is: CALL SETRES3D (XL, YL, ZL) — level 1, 2, 3

or: void setres3d (float xl, float yl, float zl);

XL, YL, ZL — is the cube size in absolute 3-D coordinates.
Default: (0.08, 0.08, 0.08).

A U T R E S 3 D

The routine AUTRES3D calculates the symbol size for cubes from the number of data points.

The call is: CALL AUTRES3D (IXDIM, IYDIM, IZDIM) — level 1, 2, 3

or: void autres3d (int ixdim, int iydim, int izdim);

IXDIM, IYDIM, IZDIM — are the number of data points in the X-, Y- and Z-directions.

Additional note: HSYM3D, SETRES3D and AUTRES3D can overwrite each other for the symbol 'cube'.

Chapter 14: Contouring

C O N T U R 2

The routine CONTUR2 calculates and plots contours of the function Z = F(X,Y), where the functions values are located on a curvilinear grid.

The call is: CALL CONTUR2 (XMAT, YMAT, ZMAT, N, M, ZLEV)
level 2, 3

or: void contur2 (const float *xmat, const float *ymat, const float *zmat, int n, int m,
float zlev);

XMAT — is a matrix of the dimension (N, M) containing the X-coordinates of the curvilinear grid.

YMAT — is a matrix of the dimension (N, M) containing the Y-coordinates of the curvilinear grid.

ZMAT	is a matrix of the dimension (N, M) containing function values.
N, M	define the dimension of XMAT, YMAT and ZMAT.
ZLEV	is a function value that defines the contour line to be calculated. ZLEV can be used for labels.

C O N S H D 2

The routine CONSHD2 plots filled contours of the function Z = F(X,Y), where the functions values are located on a curvilinear grid.

The call is:	CALL CONSHD2 (XMAT, YMAT, ZMAT, N, M, ZLVRAY, NLV) level 2, 3
or:	void conshd2 (const float *xmat, const float *ymat, const float *zmat, int n, int m, const float *zlvray, int nlv);
XMAT	is a matrix of the dimension (N, M) containing the X-coordinates of the curvilinear grid.
YMAT	is a matrix of the dimension (N, M) containing the Y-coordinates of the curvilinear grid.
ZMAT	is a matrix of the dimension (N, M) containing function values.
N, M	define the dimension of XMAT, YMAT and ZMAT.
ZLVRAY	is an array containing the levels. For polygon filling, the levels should be sorted in such a way that inner contours are plotted last.
NLV	is the number of levels.

Chapter 15: Widget Routines

S W G C B 2

The routine SWGCB2 accepts now also callback routines for main widgets. The callback routine is invoked when the size of the main widget has changed.