AIPS MEMO NO. 25

February 23, 1983

To : Distribution list

From : Ed Fomalont and Tim Cornwell

Subject : AIPS EXPLAIN Additions to HELP files

As part of an effort to improve the AIPS documentation, the AIPS group is planning to add an "EXPLAIN" section to the existing HELP files for all tasks and some complicated verbs. These extended HELP files will be accessible on the terminal although only the initial sections, the original HELP files, will usually be used on-line in most cases. It is planned that hard copies of the extended HELP files will form a collection similar to the VLA Observer's Reference manual (ORM) and hard copies will be available by each AIPS terminal and printable on demand. EXPLAINing all tasks in AIPS is a big job, so we are splitting it between all NRAO staff who have used AIPS reasonably frequently. We hope that you will accept this chance to contribute towards AIPS. The load per person is 3 to 5 EXPLAIN sections. We ask that you also review, and correct when necessary, the inital part of the HELP file to ensure consistency and accuracy.

The EXPLAIN addition to the HELP files should be typed onto the end of the HELP files which have been copied into the EXPLAIN login on either the CV VAX or the VLA VAX#1. The file name is, for example, UVMAP.HLP for UVMAP. Please follow the format indicated in the attached examples. The separator between the original HELP section and the EXPLAIN addition must be a line of 63 '-' characters, which have been already added. Do not have any text beyond column 63. The EXPLAIN section should explain what a task actually does, along with any peculiarities, and provide some sort of cross-linking with other tasks and verbs. For example, when using UVMAP it is useful to know what sort of image plane sampling is required for APCLN. A moderate number of useful references should be included, e.g. Fred's paper for ASCAL, for APCLN the papers by Schwarz and Clark, etc. The general consensus on things like UVBOX should also be included as should any useful tricks (e.g. using UVSUB,CLIP,UVSUB to remove outliers in visibility data).

To make the changes login to your VAX login (we have created new logins for those who did not have one before) and set the default login to [EXPLAIN] i.e. type at monitor level :

```
SET DEFAULT [EXPLAIN]
```

To edit the files type :

```
EDIT/SOS name.HLP
or
EDIT/EDT name.HLP
```

If you use SOS please remember to remove line numbers when editing is finished. We may send you VAX MAIL; to read this type, at monitor level:

```
MAIL
```

and then a carriage return. Control Z will get you out of the MAILer.

Please make changes in the first section of the HELP files in order to produce a more clear and consistent extended HELP file. The first section should fit on one page of the screen and only contain the most important information needed to run the task or verb. Remember, a hard

copy of these files will be available next to the terminal.

Several examples of these extended HELP files are attached. Use these as examples of the style and content intended. In writing these files, you will have to exercise the task or verb in AIPS in a variety of ways in order to refresh your memory as to the details. As you do this please use the GRIPE facility in AIPS in order to document bugs or annoyances and to improve the INPUTS files. Feel free to telephone any AIPS member in Charlottesville if you need help in understanding what the task or verb should be doing. Any further questions about the EXPLAIN section additions to the HELP files should be addressed to Ed Fomalont or Tim Cornwell at the VLA.

Some specific comments concerning the format of the EXPLAIN sections are:

1) Keep all text within the 63 columns indicated by the -'s
2) Use the identical one-line description of the task or verb used in the INPUTS file.
3) Use the style as indicated in the examples.
   a. Indent first line of each new paragraph by five spaces
   b. No empty lines between paragraphs in text
   c. Empty lines between specific comments
4) The PURPOSE section should spell out in one or two paragraphs what the task does and how it does it. Detailed descriptions should not be gone into although appropriate references should be supplied at the end of the file.
5) The COMMENTS section lists information under appropriate topics. Many of these topics will be keywords used for the task and their ordering should be the same as that in the INPUTS. Many of the KEYWORDS with obvious interpretations need not be further described in the section. Other topics which can be of help in running the task or interfacing it with other tasks and verbs should be included. Finally timing and disk usage parameters should be included at the end of this section.

The following 110 tasks and verbs are to be EXPLAINed. The EXPLAINer's name is listed below with the task or verb. The load has been distributed evenly and with some acknowledgment of the kind of AIPS processing people have done. The schedule which we shall adopt for the completion of the EXPLAIN sections is :

FEB. 24, 1983	Final agreement of EXPLAIN formats, etc
MAR. 04, 1983	Final revision of work list
APR. 15, 1983	Deadline for EXPLAIN sections
MAY 15, 1983	Incorporation into new AIPS update

The work list follows:

ALLDEST	Fomalont	APCLN	Bridle	APGS	Cornwell
APMAP	Cotton	ASCAL	Schwab	ASCOR	Schwab
AXDEFINE	Brown	AVER	Walker	AVIP	Bignell
BAMODIFY	Greisen	BATCH	Greisen	BICOP	Turner
CCMOD	Bridle	CCTP	Benson	CLICC	Benson
CLIP	Perley	CNTR	Condon	COMB	Perley
CONVL	Crane	CORER	Fomalont	CORFQ	O'dea
CORMS	Perley	CNVRT	van Gorkam	DBCON	Ulvestad
DESCM	Cotton	EXTND	Hilldrup	EXTND	Sramek
EXPND	Fickling	FFT	Wells	FLTP	Ekers
FUDGE	O'dea	GEOM	Wells	GNPLT	Owen
GRLYS	Torson	H2MEM	Cornwell	HANSM	Brown
IBMIP	Hilldrup	IMEAN	Liszt	IMFIT	Fomalont
IMLHS	Torson	IMLOD	Retallack	KONTR	Rots
LSCAL	Schwab	MAXFIT	Hjellming	MCUBE	van Gorkam
MODIFY	Bridle	MOMFT	van Gorkam	MOMNT	Rots

NTERP	Schwab	PBCOR	Fomalont	PCNTR	Condon
PHCLN	Bridle	PROCEDUR	Wells	PROFL	Fomalont
PRTAN	Bignell	PRTCC	Hilldrup	PRTDR	Ulvestad
PRTIM	Hilldrup	PRTMSG	Cornwell	PRTPL	Sramek
PRTTP	Retallack	PRTUV	Hjellming	REDIT	Turner
RGBMP	O'dea	RM	Perley	RUN	Turner
SL2PL	Fickling	SLFIT	Fickling	SLICE	Liszt
SPY	Fickling	STRIP	Crane	SUBIM	Lockman
SUMIM	Owen	T2VERB	Rots	T3BERB	Rots
TIMDEST	Owen	TKPL	Sramek	TOAIP	Cotton
TOVLB	Cotton	TRANS	van Gorkam	TV3COLOR	Greisen
TVALL	Ekers	TVBLINK	Lockman	TVLOD	Lockman
TVPSTUDO	Torson	TVROAM	Wells	TVHUEIN	Torson
TVLUT	Greisen	TVMOVIE	Rots	TVPL	Sramek
UVCOP	Walker	UVDGP	Schwab	UVDIS	Wells
UVFXP	Condon	UVFLG	Bignell	UVFND	Crane
UVLOD	Ulvestad	UVMAP	Cornwell	UVPLT	Cornwell
UVSRT	Ekers	UVSUB	Turner	VBCAL	Walker
VBCC	Benson	VBCOR	Benson	VBFIT	Walker
VBMRG	Ulvestad	VLBDR	Cotton	WSLOD	Crane
ZAP	Hjellming	SMOTH	Liszt	SUMSQ	Owen

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H2MEM
Type: Task
Use: H2MEM makes an MEM map using the LOG(brightness) form of
     entropy from a dirty map and dirty beam.
Adverbs:
  INNAME.....The dirty image name. Must be specified
  INCLASS.....The dirty image class. Must be specified
  INSEQ.......The dirty image seq. #. 0 =>any

```
   INDISK.....The dirty image disk drive #. 0 => any
   IN2NAME.....The beam image name.  blank => INNAME
   IN2CLASS....The beam image class.  blank =>
                  'RBEM' if INCLASS = 'RMAP'
                  'LBEM' if INCLASS = 'LMAP'
                  'IBEM' if INCLASS = anything else
               Only positive images can be made so that Q,U,V
               MEM images are impossible. ( One day....)
   IN2SEQ......The beam image seq . #.  0 => INSEQ
   IN2DISK.....The beam image disk drive #.  0 => any
   OUTNAME.....The MEM image name.  blank => INNAME
   OUTCLASS....The MEM image class.  blank =>
                  'RMEM' if INCLASS = 'RMAP'
                  'LMEM' if INCLASS = 'LMAP'
                  'IMEM' if INCLASS = anything else
   OUTSEQ......The MEM image seq. #.  0 => lowest unique
               If >0; image will be created if new,
               overwritten if image name exists.
   OUTDISK.....The MEM disk drive no. 0 => highest with space
   GAIN........The MEM loop gain.  0 => 0.10, for most cases
               0.50 will work well.
   FLUX........Terminate MEMing when R.M.S. residuals of the
               image are less than FLUX (Jy/beam).
               Choose a value close to that expected e.g.
               about 0.00015 for a snapshot at low frequency.
   NITER.......MEM iteration limit.  0 => 20
   DOIV........Display MEM map on IV channel 1. >= 0 => yes.
               If true, you may stop the MEMing with TV button
               0 after each MEM map is displayed.
   BADDISK.....This array contains the numbers of disks on which
               it is desired that scratch files not be located.
               BADDISK has no effect on input and output maps.

------------------------------------------------------------
H2MEM:  Task which makes an MEM image using the Log(I) entropy.
DOCUMENTOR: T.J.Cornwell NRAO/VLA
DATE OF DOCUMENTATION: 2 February 1983
RELATED PROGRAMS: UVMAP,APCLN,APGS
```

PURPOSE

H2MEM performs a deconvolution of the dirty beam from the dirty map. There are, in general, many solutions to the deconvolution problem; of these H2MEM selects the solution having the greatest entropy :

H2 = Sum over all pixels (Log(pixel Brightness))

H2 is one measure of the lack of dispersion in pixel values and thus MEM maps tend to be smooth in this sense. There are other justifications for maximising H2 but these are not widely accepted. The pragmatic view is that MEM maps of extended emission seem to be more aesthetically pleasing than those produced by the CLEAN deconvolution algorithm. In particular, CLEAN maps of large sources seem to show a mottled structure, which is caused by the assumptions inherent in the CLEAN algorithm, and which is not present on the corresponding MEM maps.

There are several undesirable features of MEM maps of which the user should be aware. First, the response to a point source in an MEM map is manifestly signal-to-noise dependent, the resolution decreasing with signal strength. To some extent this can be masked by convolving with a beam of known resolution as is done in the CLEAN algorithm. The consequence

is that comparison with other maps is impossible. Secondly, an MEM map is totally positive and therefore biased. An MEM map will always show some emission in nominally blank regions. This bias is negligible on regions of emission which are much brighter than the noise level.

H2MEM actually maximises H2 subject to the constraint that the r.m.s. residual be equal to FLUX Jansky per beam by using a lagrange multiplier approach. For the maximisation of the objective function a modified Newton-Raphson approach is used. Non-diagonal elements of the Hessian matrix are neglected. Each step or iteration requires two 2-D FFTs and so is roughly equivalent to a major cycle of APCLN.

This is an experimental program and so all feedback is welcome. Send any comments, abusive or complimentary, to Tim Cornwell at the VLA.

COMMENTS

MAPUNITS:

The final units of the MEM map are Jansky per pixel. If you prefer other units of brightness such as Kelvin then AXDEFINE can be used to change the header.

ALIASING:

To overcome aliasing problems, which can be disastrous in an algorithm which enforces positivity, only the inner quarter of the map is non-zero.

CONVERGENCE:

For maps of reasonable signal to noise 100 - 1000 about 40 - 50 iterations are needed. Convergence is attained when :

1. The r.m.s. fit is within a few percent of the value specified in FLUX.

AND 2. the angle between GRADH and GRAD CHISQ is less than about 5 - 10 degrees.

Unless both of these criteria are met the output map will not be the true MEM map.

RESTARTING:

H2MEM can be restarted by simply filling inOUTNAME, OUTCLASS and OUTSEQ with the parameters of an MEM map.NITER must, of course, be larger than the previous stopping point.

FLUX:

The only crucial control parameter is FLUX. This determines the level of fit attempted. It should be comparable to the r.m.s. noise level in a blank region of a CLEAN map thus if the data is reasonably well-calibrated this will be close to the theoretical noise level. Specifying too large a number will lead to an overly smooth map. Too small a number will prevent convergence since there will be no positive map which fits the data to that level. A useful strategy is to initially underestimate FLUX and then stop H2MEM after a number of iterations and reset it to the level acheived up to that point.

GAIN:

The control parameter GAIN only affects the route taken to the MEM map not, as in CLEAN, the final map. For most cases 0.5 seems to work fine. A lower value may help convergence in particularly difficult situations.

CONVOLUTION:

The final MEM map can be convolved down to the same resolution as a CLEAN map by using CONVL.

EXECUTION TIMES:

Typical execution time for running H2MEM in an otherwise empty VAX 11/780 with FPS120B array processor are:

256 x 256	30 min
512 x 512	1 hour
1024 x1024	4 hours
2048 x2048	1 day (? I've not had courage...)

If the map is mainly filled by emission then the APCLN runtimes will be comparable to these.

DISK SPACE:

The amount of scratch disk space allocated for the following maps is :

256 x 256	2560 blocks
512 x 512	10240 blocks
1024 x1024	40960 blocks
2048 x2048	163840 blocks

```
UVMAP
Type:  Task
 Use:  Fourier Transform UV data from a disk file to
       make catalogued images.  Several images can be made
       with one execution, one of which is a beam.
Adverbs:
  INNAME.....Input UV data file (name).  blank=>any
  INCLASS....Input UV data file (class).  blank=>any
  INSEQ......Input UV data file (seq. #).  0=>any
  INDISK.....Input UV data file disk drive #.  0=> any
  CHANNEL....Frequency channel to map.
             Use 0 for (pseudo)continuum data.
  NMAPS......Number of frequency channels to map.
             0=>1, maximum=8.
  OUTNAME....Output image name (name).  blank=>INNAME
  OUTDISK....The disk drive # of output images.  0 => highest
             with space (note: I and Beam go on same disk,
             Q and U go on same disk but may not be same on 0)
             Note:  OUTCLASS='XYYY' and cannot be specified.
             where X=Stokes, YYY=MAP or BEM
  OUTSEQ.....Output sequence number. 0=> next available
  STOKES.....Make images with these STOKES parameters
             blank =>I,B              'I'   =>I,B (B=beam)
             'IQU' =>I,Q,U,B          'IV'  =>I,V,B
             'IQUV'=>I,Q,U,V,B        'RL'  =>R,L,B
             'R'   =>R,B              'L'   =>L,B
  IMSIZE.....(X,Y) image size in pixels.
  CELLSIZE...(X,Y) pixel separation in asec.
  SHIFT......(X,Y) shift of map center from phase center in
             asec.  Map center = Phase center + shift. If X>0
             & Y>0, source shifts to south-west.
  UVTAPER....(U,V) gaussian taper (kilolambda) at 30% level
  UVRANGE....(Minimum,Maximum) baseline (kilolambda) in map.
  UVWTFN.....Weighting function of (u-v) place.
             blank=>Uniform; 'NA'=>Natural
  UVBOX......(U,V) box size for smoothing.  See HELPS
  DOGRIDCR...Apply gridding correction in maps?
  DOTV.......Display UV coverage on the TV?
  ZEROSP.....Zero-spacing value of I,Q,U,V,Weight or
             R,L,-,-,Weight.
  XTYPE......Convolution function type in X-direction
             1=Pillbox, 2=exponential, 3=Sinc, 4=Exp*Sinc,
             5=Spheroidal.  4(Exp*Sinc) is recommended.
  YTYPE.....Convolution function type in Y-direction
  XPARM.....Array containing parameters for XTYPE.
            See HELP UVnTYPE when n=convolution type.
            If STOKES='RL' or 'L' and XPARM(9) = 1.0, then
            the Lmap is made with freq = catfreq + XPARM(10)
            where units are Hz (for pseudo-cont line data).
  YPARM.....Array containing parameters for YTYPE.
  BADDISK...Disk drive #'s to avoid for scratch files

-------------------------------------------------------------
UVMAP:  Task which makes a map from UV data on disk using AP
DOCUMENTOR: T.J.Cornwell NRAO/VLA
DATE OF DOCUMENTATION: 2 February 1983
RELATED PROGRAMS: UVLOD,UVSRT,APCLN,APMAP,ASCAL

                        PURPOSE

   UVMAP makes dirty maps and beams from (u,v) data. The data
must be in 'XY' sorted order produced by UVSRT so that gridding
requires minimum core storage.  The data is then convolved onto
```

the regularly spaced grid which is used for the Fourier transform. Maps of several stokes parameters and a beam can be made with one execution.

A fairly complete description of the functions performed by UVMAP is given in the second lecture in the Proceedings of the NRAO-VLA workshop on Synthesis Mapping. Observers who are unfamiliar with interferometry are recommended to study this volume.

COMMENTS

CHANNEL, NMAPS:
Use 0. These keywords will be used with real spectral line data bases.

OUTDISK:
If OUTDISK = 0, the map and beam will be put on the same disk. The Q and U maps may be put on another disk. It is best to specify OUTDISK.

IMSIZE,CELLSIZE:
For effective cleaning of the maps, the number of pixels per beam should be such that the pixel value immediately north or east of the beam center is no less than about 50% of the peak. In the gridded data (shown on the TV if DOTV=1) the furthest point from the corner should be no more than 1/4 of the full gridsize. However, if tapering is used, the outlying (u,v) points may not have any significant weight in the map. Furthermore, the CLEAN algorithm in APCLN will only clean correctly a quarter of the map so that the dirty map size should be at least twice the size of the area to be cleaned.

STOKES:
When the only the Stokes parameter I is requested, all parallel hand data is used. When multiple Stokes parameter maps are made only that data which contains all necessary correlators is included and hence only one dirty beam is necessary. When cleaning be careful not to mix up these two types of dirty beam.

UVWTFN:
The default uniform weighting option gives higher resolution than natural weighting. However, there is a loss of about 30% in the signal to noise ratio when using uniform weighting. With uniform weighting the dirty beam size decreases slightly with larger maps, other parameters remaining unchanged. For detection experiments natural weighting is preferrable.

ZEROSP:
To improve cleaning of extended sources, the zero-spacing flux can be included in UVMAP. The weight assigned should probably be in the range 10-100 but you may need to experiment. Remember to clean deeply enough.

UVBOX:
The effects of using UVBOX not equal to zero are unclear. It should, to some extent, suppress sidelobes due to unusual fluctuations in the u,v plane sampling such as occurs at the end of a long track.

XTYPE,YTYPE:
The default convolution function EXP*SINC is recommended for nearly all maps.

SPECTRAL LINE:

When making spectral line map from pseudo-continuum data the user may want to correct for the frequency difference between the channels stored in the R and L if slots. At the moment this information is not stored in the header and so must be inserted by hand. To do this set XPARM(9) to 1.0 and set XPARM(10) to the channel spacing in HERTZ.

EXECUTION TIMES:

Typical execution time for running UVMAP in an otherwise empty VAX 11/780 with FPS120B array processor are :

256 x 256	1 min
512 x 512	3 mins
1024 x1024	5 mins
2048 x2048	15 mins

DISK SPACE:

The amount of disk space allocated for the following maps is:

256 x 256	256 blocks
512 x 512	1024 blocks
1024 x1024	4096 blocks
2048 x2048	16384 blocks

REFERENCES

Proceedings of the NRAO-VLA workshop on Synthesis Mapping 1982, ed. A.R.Thompson and L.R.D'Addario.

```
IMFIT
Type: Task
Use:  IMFIT is a task to fit a portion of an image with up to
      four (4) gaussian components.
Adverbs:
  USERID......The ID of the owner of the images. 0=>current
              user.  32000=>all users.
  INNAME......First image name (name).  blank=>any
  INCLASS.....First image name (class).  blank=>any
  INSEQ.......First image name (seq. #).  0=>any
  INDISK......Disk drive # for the first image.  0=>any
  BLC.........Bottom left corner of area of image to fit.
  TRC.........Top right corner of area of image to fit.
              Maximum area is 1900 pixels
  NGAUSS......The number of gaussian components to use in the
              fitting.  0->1.  Maximum number is four.
  GMAX........The peak value guess for each component.
  GPOS........The position (X,Y) guess for components.  The
              values are in pixels in the order (X1,Y1,X2,Y2,
              X3,Y3,X4,Y4)
  GWIDTH......The major axis, minor axis and position of major
              axis guess for components.  The values are in
              pixels.  0->Use clean beam, if available;
              otherwise it will be taken as a circular
              Gaussian of diameter 2.  The order is
              (MJ1,MN1,PA1,MJ2,MN2,PA2,...etc).
  NITER.......The maximum number of iterations to use in the
              fitting. 0-> NGAUSS * 100.
  EDROP.......A tolerance level for cutoff.  0->10**(-10)
              Flags for holding any of the parameters constant
                 1 -> let parameter vary.
                -1 -> keep parameter fixed.
  DOMAX.......Flags for GMAX
  DOPOS.......Flags for GPOS
  DOWIDTH.....Flags for GWIDTH
  DOVECT......1 -> List map, model and residual map on line
              printer--as well as fit information
  DOCAT.......1 -> Catalog residual map with fitted components
              (Not yet implemented)

------------------------------------------------------------
IMFIT: Task to fit Gaussian models to an image.
DOCUMENTOR: E.B.Fomalont NRAO/VLA
DATE OF DOCUMENTATION: 10 February 1983
RELATED PROGRAMS : SLFIT,IMEAN,MAXFIT
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PURPOSE

IMFIT fits up to four Gaussian-shaped components to a selected part of an image. It is most commonly used to derive the position, peak and integrated intensity and angular size of a source which is not too extended. An initial guess for the parameters, some of which are picked as defaults, must be supplied before running the task. Solution and error estimates are generated and the residual image after the fit can be printed on the line-printer. An arbitrary selection of parameters may be held constant in the solution.

The fitting algorithm is based on the subroutine LMDER in the Argonne National Laboratory Subroutine Package and the algorithm uses a linearized least-square solution to obtain the parameters. Occasionally, the solution will converge on an obviously unacceptable fit. If this occurs when fitting one component to the source, try a better first guess. When

fitting several components to a blobby source, the fitted parameters may be absurd. Careful selection of fixed parameters will then be necessary

COMMENTS

BLC, TRC:
The fitting area should be chosen as small as possible; and several disconnected components should be fit separately. The fitting area is limited to an area of 1900 pixels.

GMAX, GPOS:
The initial guess of the model intensity and position must be supplied. The units of GMAX are in map units and GPOS are in pixels. A TV-interactive routine for supplying these parameters is given by the procedure INPFIT(I) where I is the number of components. Follow the directions on the terminal for its use. The procedure is stored in the RUN file INPFIT.

GWIDTH:
The defaults for the component widths are generally reasonable; either the clean beam size of a circular beam of two pixels FWHP. Because of poor convergence properties of the algorithm for circular Gaussian models, the task will introduce a slight ellipticity before beginning the fitting. This is not done if either axes is held constant.

NITER, EDROP:
The number of interative iterations, NITER, is defaulted to 100*NGAUSS, which is reasonable. If you are unsure if your model is satisfactory or is converging to a reasonable solution, especially for fits to complicated sources with several gaussians, set NITER=50 and check how the convergence is going. EDROP is used to terminated the fitting if convergence is apparent. It is set to 10**(-10) and should not be changed in most circumstances.

DOWIDTH:
In fitting complicated sources, it is common to hold some of the component diameters fixed in order to obtain reasonable convergence.

DOVECT:
Set DOVECT = 1 in most cases. This produces an automatic hard copy of the solutions and a digital map of the input image, the first guess and the residuals. These maps are most useful for determining the validity of the fit.

DOCAT:
This option is not yet implemented.

FLUX DENSITY DETERMINATION:
When attempting to obtain the flux density of a well-resolved source, the task IMEAN, which integrates the map values in a specified rectangle, is often more accurate than fitting the source with several Gaussian components and summing the integrated flux densities.

PEAK FLUX DENSITY DETERMINATION:

The verb MAXFIT, a simple fitting of the peak of a component with a second degree interpolation, is much faster than IMFIT and useful to obtain the approximate peak and position of a component.

ZERO LEVEL:

If you wish to fit for a zero-level in addition to other components, do the following:

1. Add an additional component to NGAUSS
2. Set its GMAX to 0 and its DOMAX to 1
3. Set its GPOS to the central pixel in the fitted region and its DOPOS to -1,-1
4. Set its GWIDTH to 50,50,0 and its DOWIDTH to -1,-1,-1

DECONVOLUTION:

When fitting to a clean map, IMFIT deconvolves the clean beam from the fitted component size. The upper and lower limits to the major axis, the minor axis and the position angle of the major axis for the component are also computed and placed in parenthesis. These limits are obtained by adding and subtracting the component errors to the fitted values and deconvolving the clean beam.

ERRORS IN GENERAL:

The error estimates should be regarded as tentative. They are probably mildly underestimated for one component fits and somewhat underestimated for multi-component fits since they do not reflect the interactions among the separate parameters.

EXECUTION TIME:

20 seconds cpu for
1 COMPONENT with 6 PARAMETERS in 11 x 11 AREA with 50 (NITER) iterations.
cpu times scales linearly with PARAMETERS, AREA and NITER.

PROFL
Type: Task
Use: PROFL will write commands to a plot file for the
execution of a profile plot (3D projection) for a
cataloged file. The image plane is the X-Y plane
and the image intensity is on the Z-axis.
Adverbs:
USERID.....The ID of the owner of the image. 0=>current
user. 32000=>any users.
INNAME.....Image name (name). blank=>any
INCLASS.....Image name (class). blank=>any
INSEQ.....Image name (seq. #). 0=>any
INDISK.....Disk unit #. 0=>any
INTYPE.....Image type. blank=>any
BLC.....Bottom Left Corner of image to contour.
(0,0) means entire image.
TRC.....Top Right Corner of image to contour.
(0,0) means entire image.
XYRATIO.....The ratio of the X-axis to Y-axis pixel
pixel separations. 0 => use ratio of axis
increments or windows.
ZXRATIO.....The ratio (Z/X) between the length of the
unrotated (but scaled) X-axis and the max Z-axis.
Use this as an intensity scaling factor.
ROTATE.....The rotation in deg of th X-Y plane (count-clkw)
SKEW.....The rotation (deg) of the X-Y plane away from the
observer.
DIST.....The distance from center of the image in X-axis
lengths (unrotated, but scaled by XYRATIO).
For DIST=100, the profile plot is flat.
XINC.....Draw a line every XINCth row. 0=>do not draw row
Use 1,2 or 3 for the first try.
YINC.....Draw a line every YINCth col. 0=>do not draw col
Use 0 for the first try.
PIXRANGE....Min,Max of image intensity. 0=>entire range
ITYPE.....Labelling type: 1 = border, 2 = no ticks,
3 = standard, 4 = relative to ref. pixel,
5 = relative to subimage (BLC, TRC) center
6 = pixels
SNCUT.....Cutoff level in input multi-bit blanked images.

PROFL: Task to generate a plot file for a profile display.
DOCUMENTOR: E.B.Fomalont NRAO/VLA
DATE OF DOCUMENTATION: 10 February 1983
RELATED PROGRAMS : PRTPL,TKPL,TVPL,CNTR,GREYS,SLICE

PURPOSE

Profile plots consist of vertical and/or horizontal line profiles where the height above the image plane, drawn in perspective, is proportional to the intensity. This display type is also called an isometric plot and each line profile is called a slice plot. Profile plots give a good three-dimensional appearance of a radio source. Negative features are well-depicted and extended features are more obvious than on contour plots or gray-scale plots.

This task PROFL is very general and the user can control the perspective geometry associated with this display. For the most simple use of this task in which no perspective is used, set DIST=100 and leave the other adverbs in their defaulted value. For large maps it is best to set XINC=5 and YINC=0 for a first look without spending much execution time.

COMMENTS

XYRATIO:
This is the ratio between the separation of an X-pixel and a Y-pixel. The default is normally a good choice unless the map window is very rectangular.

ZXRATIO:
This parameter is proportional to the X-pixel separation by the height of the maximum value in the display as given by PIXRANGE. The value 1.0 means that the maximum intensity value will be drawn about equal to the size of the full X-axis; thus, the value of 0.2 is reasonable. Some adjustment of the intensity scale can be made using this adverb. If the map is dominated by a point component of high amplitude, it is best to use PIXRANGE to limit the intensity range to be plotted. The profile plot always self-scales in order to fit the entire plot on one page. If the point source dominates, the X-Y plane will be suitable reduced in size.

ROTATE:
The rotation of the X-Y plane about the Z-plane is degrees (positive rotation is counter-clock-wise).

SKEW:
The rotation in degrees of the X-Y plane with respect to the observer. It is nominally 45 deg and is satisfactory in most usage. A value of 90 deg means the X-Y plane is seen edge-on. A value of 0 deg means the X-Y plane is seen face on and the intensity profiles are invisible. The amplitude of an intensity feature on the plot varies as SIN(SKEW).

DISTANCE:
The distance from the center of the X-axis to the observer. The default distance of 3 gives a nice 3-D projective display. Set DISTANCE to 100 in order to give a flat-plane appearance similar to Westerbork Style line plots.

XINC,YINC:
The default values generally produce a plot which is more complicated than needed. As a first try set XINC=5 and YINC=0 and go from there.

PIXRANGE:
Profile plots do not display large ranges of intensity very well, no more than about 30 to 1. Use PIXRANGE in order to limit the intensity range as desired.

DISPLAY OF PROFILES:
As with most plotting programs in AIPS a subsequent task is used to display the output of PROFL on a device. The tasks GO TVPL or GO TKPL are useful for quick looks, while GO PRTPL gives the best hard copy but is more time consuming.

QUALITY OF PLOT:
On termination of PROFL, the messiness of the plot can be judged by the message on the monitor,

GFINIS: NUMBER RECORDS GUESSED NNN USED MMM

If MMM is greater than about 2000, the plot is probably too mossy to be useful. If MMM is less than about 20, nothing

much, except borders, etc., was produced.

EXECUTION TIMES:

For a 100 × 100 map with XINC=1, YINC=0, the execution time is about 20 sec and about 200 records are produced. For YINC=1 as well, the execution time increases by a factor of 4. Further scaling of execution times goes with map area.