

DF_CONTOUR[®][©]

VERSION 2

User Manual

**A CONTOUR AND VECTOR PLOTTING TOOL
FOR SCIENTIFIC DATA VISUALIZATION**

DYNAFLOW, INC.

RESEARCH AND DEVELOPMENT IN APPLIED SCIENCES

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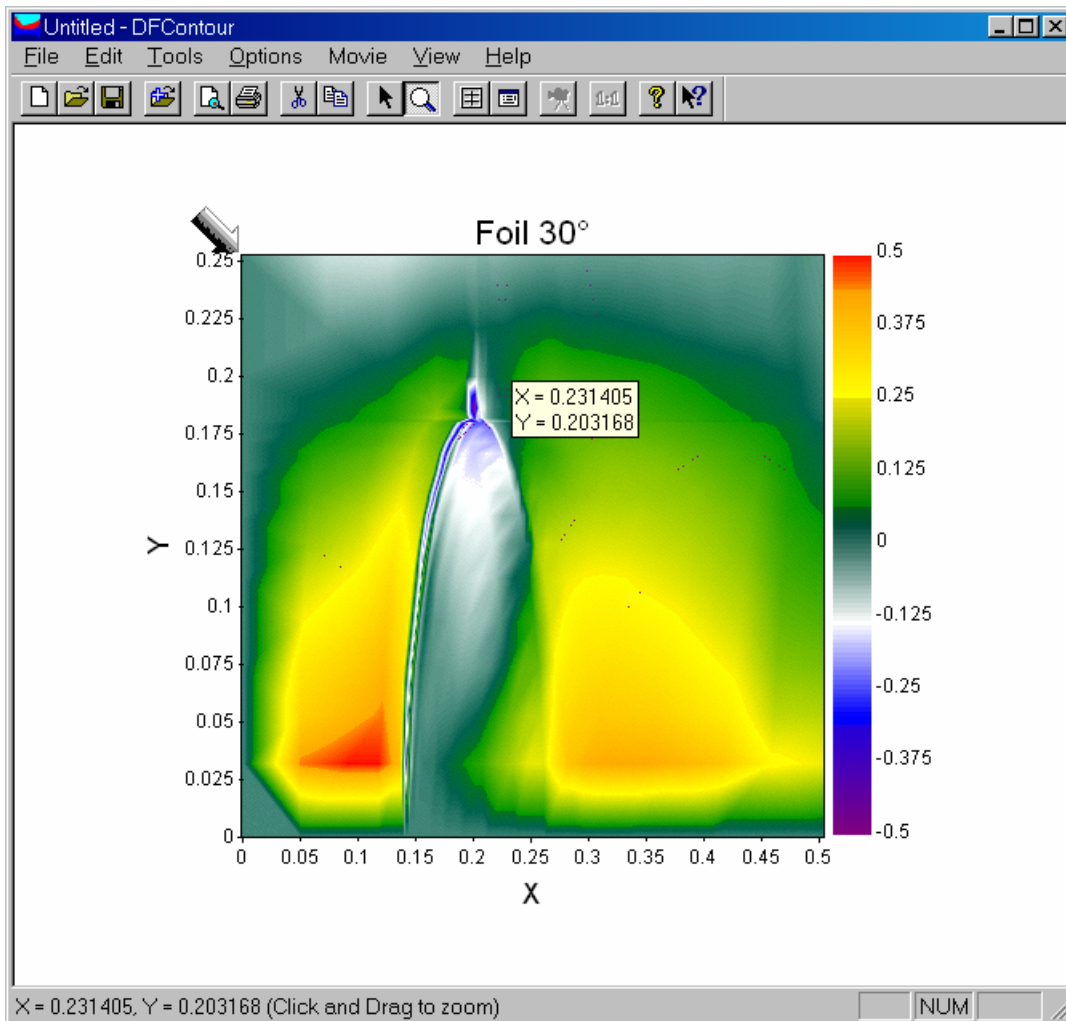
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OVERVIEW

DF_CONTOUR is a Microsoft Windows® 95/NT® program for color contour plot representation for the visualization of scientific data. It uses a simple ASCII file format for the description of the DATA to represent.

Scientists and engineers at DYNAFLOW, INC. faced with the complexity and limitations of existing contour and vector plotting programs developed their own easy to use software package for visualizing scientific data.



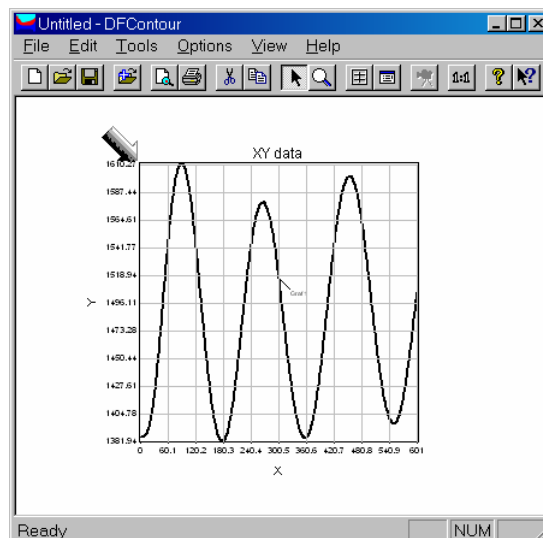
DF_CONTOUR generates publication ready visualizations from numerical or experimental result data. At DYNAFLOW, INC. we use this tool to represent results from laboratory experiments and to analyze the results of fluid dynamic programs we have developed such as 2DYNAFS© and 3DYNAFS© (*please visit our web site <http://www.dynaflo-nc.com/2-3DynaFS.htm> for more information*).

Specifically designed to be user friendly, efficient and flexible, DF_CONTOUR quickly allows the user to produce color graphic representation of the data in the format chosen, such as '*Vector Fields*', '*Scalar Fields*', '*Shapes or Curves*', '*Markers*', '*XY graphs*', *etc.*

DF_CONTOUR recognizes a simple user generated ASCII file format for the representation of numerical data. Only a one-word descriptor is required at the beginning of each data set to let DF_CONTOUR identify what type of data is being represented. Also, DF_CONTOUR can represent normal XY ASCII files with unlimited number of columns.

HIGHLIGHTS OF DF_CONTOUR FEATURES

- Up to 16 different data sets can be viewed simultaneously
- Sets of data can be displayed on a page in rows and columns
- Results are printed as displayed
- Simple point and click graph property modification
- On the fly selection of color palettes
- User defined color palettes in a very friendly and intuitive manner
- Easy modification of scales
- Color scalar and vector contours.
- Color scalar and vector "ISO-contours"
- Vector plotting mode
- Interpolation scheme to enhance poorly described data
- Outlines
- Outline animation
- Easy control of all visual aspects of data sets
- Markers
- Easy control of the Size and Color of Markers
- X-Y graph with unlimited number of columns
- Segment, Dots and Polyline modes for X-Y graph representation
- Drag and Drop
- Etc.

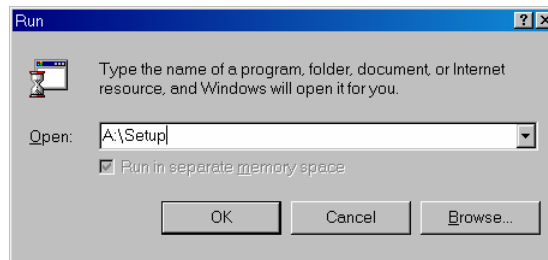


HOW TO...

INSTALLING DF_CONTOUR

DF_CONTOUR is a Windows 95/NT program and uses an InstallShield wizard for the installation.

- Insert DF_CONTOUR diskette in your floppy drive,
- Click the Windows Start menu command,
- Select Run...,
- Type A:\Setup and follow the instructions.



FAST START

DF_CONTOUR is an easy to use contouring and graphing program. It comes with several sample files installed in the Examples directory under DF_CONTOUR's path.

After you load DF_CONTOUR, double click the grayed rectangular zone in the center of the program window and choose a file from the Example directory. Once the sample is loaded and drawn on the screen, double-click the graph to edit its properties (*see Graph Properties in Options Menu section*).

DF_CONTOUR accepts two types of private file formats with the extensions '.CPV' and '.STG', as well as simple ASCII DATA files.

'CPV' files are simple ASCII data files preformatted with tags describing the data they contain (*see Appendix A for details*).

'STG' files are the DF_CONTOUR document file format. They are based on the standard initialization file format (*see Appendix B for details*).

MENU COMMANDS

FILE MENU

NEW

Creates a new DF_CONTOUR document. A DF_CONTOUR document is a layout of different graphs organized in rows and columns. If the currently loaded document has changed, the user will be prompted to save his work.


Keyboard: **Ctrl+N**

Toolbar: 

OPEN...

Opens a DF_CONTOUR document and makes it as the active document. If the currently loaded document has changed, the user will be prompted to save his work. DF_CONTOUR uses a standard file format based on the Initialization (.INI) file format (*see Appendix B for a full description of DF_CONTOUR documents file format*).

Keyboard: **Ctrl+O**

Toolbar: 

SAVE...

Saves the active DF_CONTOUR document. If the active document was created with the New command, the user will be prompted to give a name to this document (*see Save As in the next paragraph and Appendix B for a full description of DF_CONTOUR documents file format*)

Keyboard: **Ctrl+S**

Toolbar: 

SAVE AS...


Saves the active document under a different name. If the chosen name already exists DF_CONTOUR will prompt the user to overwrite the file. (*see Appendix B for a full description of DF_CONTOUR documents file format*)

Keyboard: **none**


Toolbar: none

ADD GRAPH...

Adds a graph from a file to the active document. The graph can be a DF_Contour special .CPV file (*see Appendix A for a full description of .CPV files*) or a standard ASCII Data file.

The graph will be hosted in the currently selected 'graph zone' if this zone is free, if not it will be hosted by the first free 'graph zone'. Graphs can be dropped in DF_CONTOUR from the Windows Explorer. The selected 'graph zone' has this arrow  on its upper-left corner

Keyboard: **Insert**

Toolbar: 

PRINT...

Use this command to print a document. This command presents a standard Windows 'Print Dialog Box' (figure 4), where you may specify the range of pages to be printed, the number of copies, the destination printer, and other printer setup options.

Keyboard: **Ctrl+P**

Toolbar: 

PRINT PREVIEW

Use this command to display the active document as it would appear when printed. When you choose this command, the main window will be replaced with a print preview window in which one or two pages will be displayed in their printed format. The print preview toolbar offers you options to view either one or two pages at a time; move back and forth through the document; zoom in and out of pages; and initiate a print job.

Keyboard: **none**

Toolbar: 

PRINT SETUP...

Use this command to select a printer and a printer connection. This command presents a standard Windows 'Print Setup Dialog Box' (figure 4), where you specify the printer and its connection.

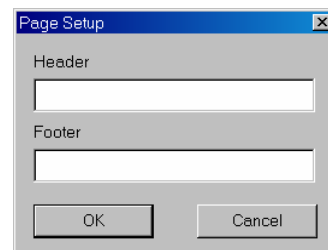
Keyboard: **none**

Toolbar: **none**

PAGE SETUP...

The Page Setup command is used to set the header and footer of the current document. The header and footer will appear only on the printed document.

- *Header:* The text to be printed on top of the document.
- *Footer:* The text to be printed on the bottom of the document.



Keyboard: **none**

Toolbar: **none**

SEND...

Use this command to send the active document through electronic mail. This command presents a mail window with the active document attached to it. You may then fill out the “To:” field, “Subject:” field, etc., and add text to the body of the message if you wish. When you are finished you may click the “Send” button to send the message.

Keyboard: **none**

Toolbar: **none**

MOST RECENTLY USED FILES

The numbers and filenames listed at the bottom of the File menu form a list of the Most Recently Used files. This list stores up to 9 different document names. Choose the number that corresponds with the document you want to open.

Keyboard: **none**

Toolbar: **none**

EXIT

Use this command to end your DF_CONTOUR session. You can also use the Close command on the application Control menu. DF_CONTOUR prompts you to save documents with unsaved changes.

Keyboard: **Alt+F4**

Mouse: **Double-click the application's Control menu button**

Toolbar: **none**

EDIT MENU

UNDO

Use this command to reverse the last editing action, if possible. The name of the command changes, depending on what the last action was. The “Undo” command changes to “Can’t Undo” on the menu if you cannot reverse your last action.

Keyboard: **Ctrl+Z**

Toolbar: **none**

COPY

Use this command to copy selected ‘graph zone’ onto the clipboard. This command is unavailable if the selected ‘graph zone’ has no data associated with it.

Copying data to the clipboard replaces the contents previously stored there.

Keyboard: **Ctrl+C**

Toolbar: 

DELETE

Use this command to remove the graph from the currently selected ‘graph zone’. Removing data from a ‘graph zone’ will delete all the settings associated with this graph zone.

Keyboard: **Delele**

Toolbar: 

TOOLS MENU

SELECT

Use this command to switch to select mode. In the select mode, using the mouse you can double-click an empty ‘graph zone’ to associate data to it (*see Add Graph... section*), double-click a valid ‘graph-zone’ and edit/change its properties (*see Graph properties... section*), and click and drag to move around ‘graph zones’.


Keyboard: **none**

Toolbar: 

ZOOM

Use this command to switch to zoom mode. In the zoom mode, you can click and drag to zoom on the defined rectangular area in a valid ‘graph zone’.

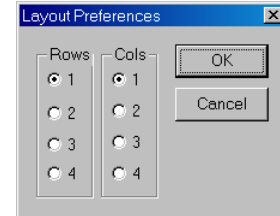
Keyboard: **none**

Toolbar: 

OPTIONS MENU

LAYOUT

Use this command to control the layout of the 'graph zones' in DF_CONTOUR. The user can select any combination of a layout between 4 rows and 4 columns.



Keyboard: none

Toolbar:

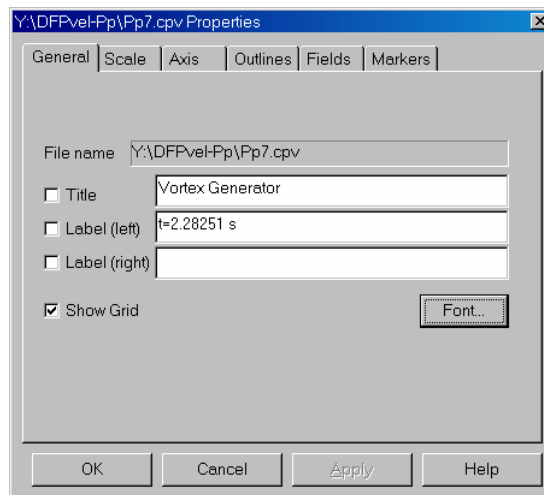
GRAPH PROPERTIES

Use this command to control the properties of the currently selected 'graph zone'. Depending on the type of data of the 'graph zone', .CPV file or an ASCII file, the properties would have more or less available options.

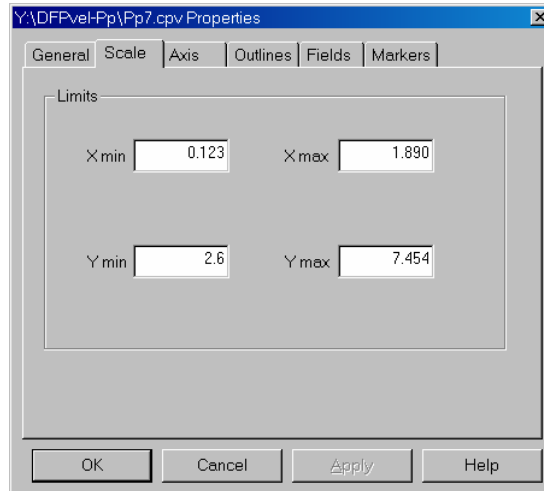
Keyboard: F5

Toolbar:

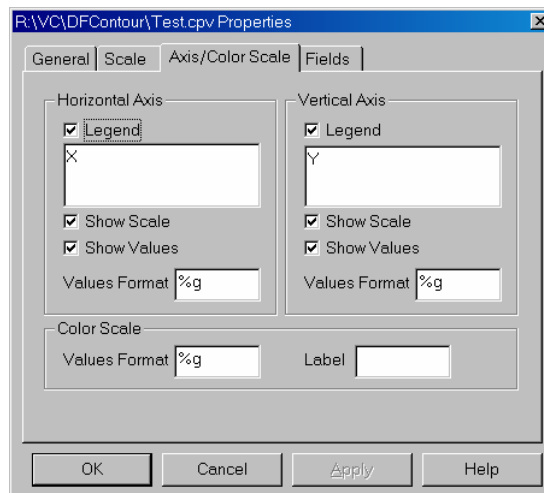
General:



- *File Name* is the name of the file associated with the currently edited 'graph zone'.
- *Title* is the title of the 'graph zone'. Check the box at the left to make the title visible. The text of the title will be shown at the top center of the 'graph zone'.
- *Label (left)* is the label to be shown on the upper-left corner of the 'graph zone'. Check the box at the left to make it visible.
- *Label (right)* is the label to be shown on the upper-right corner of the 'graph zone'. Check the box at the left to make it visible.
- *Show Grid* shows/hides a grid on top of the 'graph zone'
- *Font...* invokes a Dialog Box to choose a different font. Only TrueType fonts are accepted.

Scale:

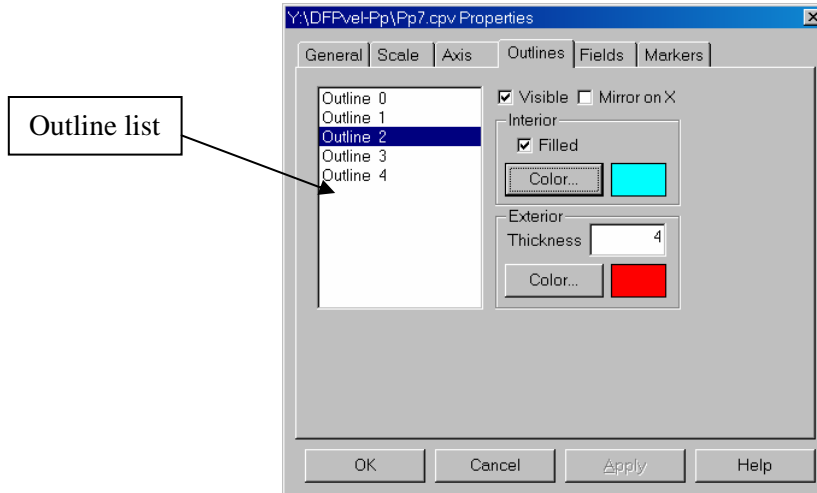
This Property page is used to precisely control the scales of the current 'graph zone'. You can use the zoom mode to visually zoom or scale a rectangular region on the graph.

Axis:

This property page controls the appearance of the vertical and horizontal axis of the current 'graph zone'.

- Legend shows/hides the legend text. The text is entered in the input box below the Legend.
- Show Scale shows/hides the tick marks on the axis.
- Show Values shows/hides the values on the axis.
- Values Format is the format of the values shown on the axis. This follows the 'C' language *printf* format. Refer to Appendix C for details.
- Color Scale / Values Format is the format of the values shown on the color scale.
- Color Scale / Label is the text used for the color scale label.

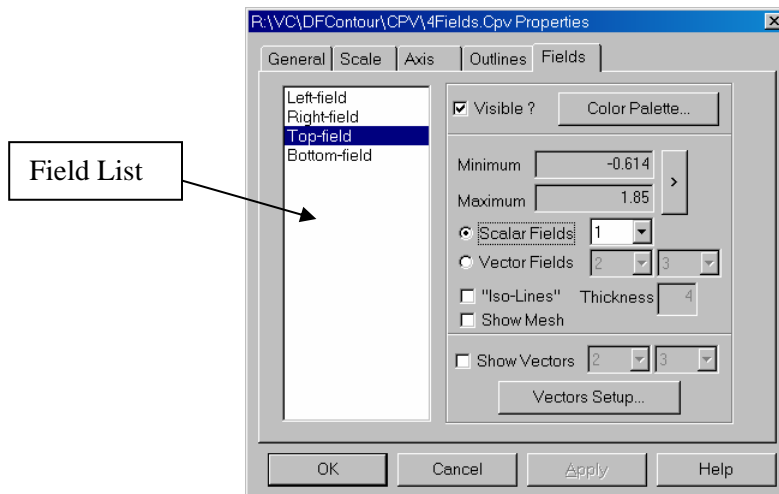
Outlines: (available only with a .CPV file with #OUTLINE tags)



This property page controls the appearance of the Outlines of the current 'graph zone'.

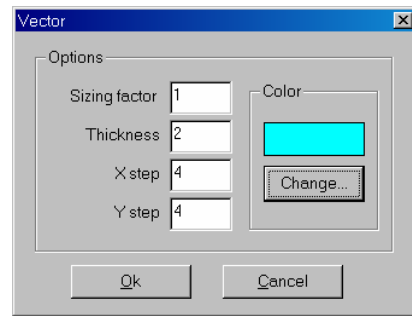
- Outline List shows a list of available Outlines. The highlighted item(s) will be considered as the active outline(s).
- Visible shows/hides the active outline.
- Mirror on X mirrors on X axis the active outline if checked.
- Interior / Filled fills the interior of the active outline.
- Interior / Color invokes a standard Windows Color Picker to change the interior (fill) color of the active outline.
- Exterior / Thickness changes the thickness of the line used to draw the outline. This value should be between 1 and 9.
- Exterior / Color invokes a standard Windows Color Picker to change the color of the line used to draw the active outline.

Fields: (available only with a .CPV file with #FIELDx tags)



This property page controls the appearance of the Fields of the current 'graph zone'.

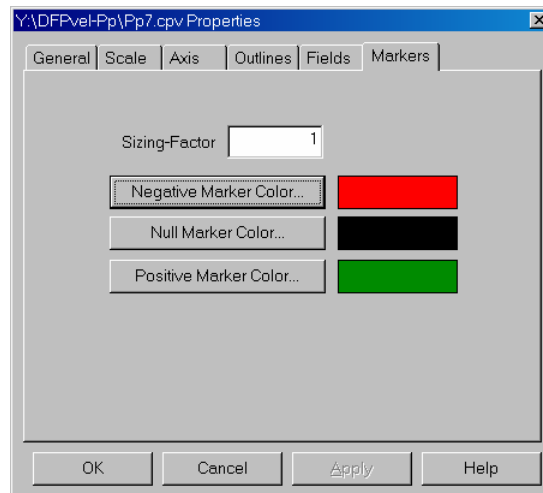
- Fields List shows a list of all the available fields. The highlighted item(s) will be considered as the active field(s).
- Visible shows/hides the active field(s).
- Color Palette edits the colors used for the fields in the active field(s). (see Appendix D for a full description)
- Minimum/Maximum shows the current limits of the chosen contour (Scalar or Vector). To change the limits of the quantities included with the active field click the (>) button.
- Scalar Field interpolates and plots Scalar Contours using the Quantity defined in the ‘drop-down control’ on the right.
- Vector Fields interpolates and plots Vector Contours using the Quantities defined in the ‘drop-down controls’ on the right. The first ‘drop-down control’ being the U component and the second the V component.
- “ISO-Lines” plots using “ISO-contours”.
- Thickness is the thickness of the line used to plot the “ISO-contours”.
- Show Mesh shows/hides the Mesh used to generate the contours.
- Show Vectors plots Velocity Vectors using the Quantities defined in the ‘drop-down controls’ on the right. The first ‘drop-down control’ being the U component and the second the V component.
- Vectors Setup controls the visual appearance of the vectors.
 - Sizing Factor is the multiplier used on the length of the vectors.
 - Thickness is the thickness of the line used to plot the vectors.
 - X, Y step controls the density of the drawn velocity vectors.
 - Color Change is used to change the color of the drawn vectors.



Markers: (available only with a .CPV file with #MARKER tag)

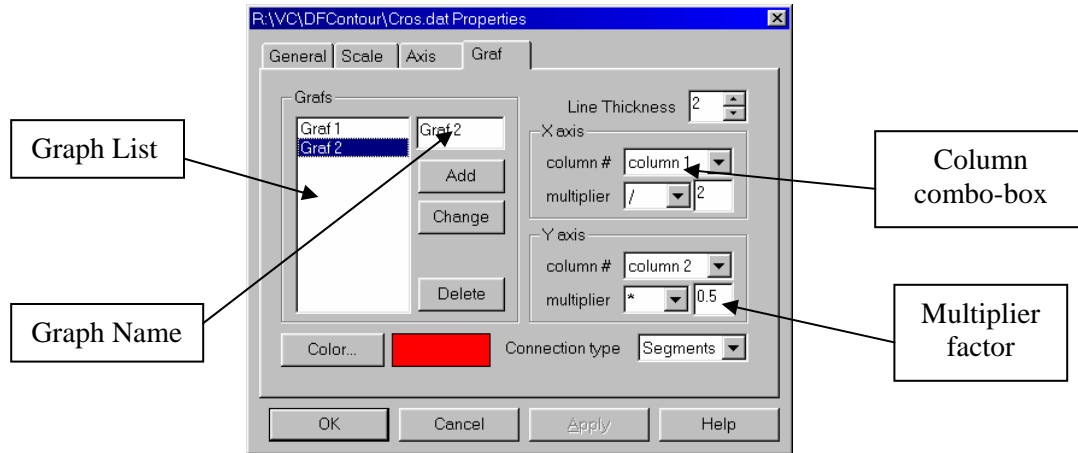
Use this property page to control the appearance of the markers.

- Sizing-Factor is the multiplier used on the size of the markers.
- Negative Marker Color is the color in which markers with negative values are drawn.
- Null Marker Color is the color in which marker with a ‘zero’ value are drawn.
- Positive Marker Color is the color in which markers with positive values are drawn.



X-Y Graph (available only with X-Y Graphs)

Use this property page to control the appearance of X-Y graphs. By default, DF_CONTOUR will choose data column 1 as the X axis and data column 2 as the Y axis. Where the data consists of only one column file, the data column will be assigned to the Y axis and the line number the X axis. Using this property page you add graphs to the current 'graph zone', change the visual aspects and the connection type used to draw the graphs.




- **Graph List** shows a list of the available XY Graphs. The highlighted item(s) will be considered as the active graph(s).
- **Add** creates a new graph and adds it to the graph list. The new graph name will be the name entered in the Graph Name input box.
- **Change** changes the name of the active graph.
- **Delete** deletes the active graph.
- **Line Thickness** changes the thickness of the line used to draw the graph.
- **X axis / column #** is the column used for the X axis.
- **X axis / Column combo-box** is the list of the available columns.
- **X axis / multiplier** is a multiplier used on the X axis. Five types of multipliers are available: none, *, /, + and -.
- **X axis / Multiplier factor** is the factor associated with the multiplier on the X axis.
- **Y axis / column #** is the column used for the X axis.
- **Y axis / Column combo-box** is the list of the available columns.
- **Y axis / multiplier** is a multiplier used on the X axis. Five types of multipliers are available: none, *, /, + and -.
- **Y axis / Multiplier factor** is the factor associated with the multiplier on the Y axis.
- **Color** is the color used to draw the active graph.
- **Connection Type** is the type of connection between the XY points used to plot the graph. The connection can be: Segments (point1 connected to point2, point3 connected to point4 ...), Polyline (point1 connected to point2, point2 connected to point3), and Dots (no connection between points, a marker is drawn of the point position).

ANIMATE OUTLINES

Use this command to animate the outlines of the current 'graph zone'. For this option to be available the associated .CPV should have at least 3 #OUTLINE tags. See the included **2DContc.CPV** file and the next section (Outline Animation Setup).

Keyboard: none

Toolbar: 

OUTLINE ANIMATION SETUP

Use this command to control the behavior of the Outline Animation.

Time Step is the delay between frames in the outline animation.

Show is the number of successive outlines to show in each frame.

Skip is the number of successive outlines to skip between frames.


Keyboard: none

Toolbar: 

ZOOM ORIGIN

Use this command to force the scales to the values read from the original file.

Keyboard: none

Toolbar: 

APPENDIX A

‘.CPV’ FILE FORMAT

Document conventions:

\n new line

\t tab character

[...] optional parameter

The .CPV file format is a simple ASCII file with special tags. Each tag has a special meaning and indicates the type of the data it is describing. Tags start with a # sign and ends with a new line (\n). Some tags accept a descriptor before the (\n). They are always followed by at least one line describing the data. For instance, the following two lines describe a *'title'* tag with *'My Title'* as data:

```
#TITLE
My Title
```

Tags don't have to be on the first column, but they can only be preceded by the space character (ASCII 32) or \t.

Empty lines are allowed anywhere in .CPV files.

A .CPV file should always have a new line after the last data.

DF_CONTOUR generates error messages in the case it encounters a problem in a file. In the error message a line number will be given. This line number indicates in reality the tag number (in the order it was read) in the file.

DF_CONTOUR may confuse a normal ASCII data file with a .CPV and generate an error message if the ASCII file has a line with the # sign as the first character.

TAGS AND DESCRIPTION

#TITLE

This is a tag describing a title for the graph. It has to be followed by a string containing the text of the title. Only one title tag is allowed in a file (in the case of the existence of multiple titles the last one will be used).

Format:

```
#TITLE
string
```

#COMMENT

This is a tag describing a 'comment'. It has to be followed by a string containing the text of the 'comment'. Only one 'comment' tag is allowed in a file (in the case of the existence of multiple 'comments' the last one will be used). The text of the 'comment' will be used at run-time whenever the user moves the mouse cursor over the zone hosting the .CPV file. This comment will be shown in the StatusBar.

Format:

```
#COMMENT  
string
```

#TIME

This is a tag describing time of the .CPV file. It has to be followed by a real number containing the 'time' then by a string describing the unit to be used. This tag is very useful when using successive .CPV files for animation. The difference between time tags will be used as a delay between images. Only one 'time' tag is allowed in a file (in the case of the existence of multiple 'times' the last one will be used).

Format:

```
#TIME  
real string
```

#LEFTLABEL

This is a tag describing a label to be shown on the upper-left corner of the zone hosting the .CPV file. Only one 'leftlabel' tag is allowed in a file (in the case of the existence of multiple 'leftlabels' the last one will be used).

Format:

```
#LEFTLABEL  
string
```

#RIGHTLABEL

This is a tag describing a label to be shown on the upper-right corner of the zone hosting the .CPV file. Only one 'rightlabel' tag is allowed in a file (in the case of the existence of multiple 'rightlabels' the last one will be used).

Format:

```
#RIGHTLABEL  
string
```

#OUTLINE

This is a tag describing an XY outline, shape or curve. Multiple outlines can exist in a .CPV file. An outline can have a descriptor immediately following its tag on the same line and before the (n). The descriptor is optional and is read as a string.

Format:

```
#OUTLINE [descriptor]
n
X1 Y1
X2 Y2
...
...
Xn Yn
```

where **descriptor** is a *string* describing the outline, **n** is an *integer* describing the number of XY pairs forming the outline, and **X₁ Y₁** to **X_n Y_n** are *reals* describing the outline.

#FIELD1 OR #SCALAR

This is a tag describing a zone with **one** quantity to contour. Multiple fields can exist in a .CPV file. A field can have a descriptor immediately following its tag on the same line and before the (n). The descriptor is optional and is read as a string.

Format:

```
#FIELD1 [descriptor]
nx ny
Y1 X1 Q1,1
Y1 X2 Q2,1
...
...
Y1 Xnx Qnx,1
...
...
Yny X1 Q1,ny
Yny X2 Q2,ny
...
...
Yny Xnx Qnx,ny
```

where **nx** and **ny** are integers indicating the number of points on the grid describing the zone to contour. **X_{1..nx}, Y_{1..ny}** are reals and are the coordinates of the quantity Q (real) on the grid.

#FIELD2 OR #VECTOR

This is a tag describing a zone with **two** quantities to contour. Multiple fields can exist in a .CPV file. A field can have a descriptor immediately following its tag on the same line and before the (\n). The descriptor is optional and is read as a string.

Format:

```
#FIELD2 [descriptor]
nx ny
Y1 X1 Q1,1 Q2,1
Y1 X2 Q1,2 Q2,2
...
...
Y1 Xnx Q1,nx Q2,nx
...
...
Yny X1 Q1,ny Q2,ny
Yny X2 Q1,2,ny Q2,2,ny
...
...
Yny Xnx Q1,ny,ny Q2,ny,ny
```

where **nx** and **ny** are integers indicating the number of points on the grid describing the zone to contour. X_{1..nx}, Y_{1..ny} are reals and are the coordinates of the quantities Q1 and Q2 (reals) on the grid.

#FIELD3 OR #PRESSVEL OR #SCALAR&VECTOR

This is a tag describing a zone with **three** quantities to contour. Multiple fields can exist in a .CPV file. A field can have a descriptor immediately following its tag on the same line and before the (\n). The descriptor is optional and is read as a string.

Format:

```
#FIELD3 [descriptor]
nx ny
Y1 X1 Q1,1 Q2,1 Q3,1
Y1 X2 Q1,2 Q2,2 Q3,2
...
...
Y1 Xnx Q1,nx Q2,nx Q3,nx
...
...
Yny X1 Q1,ny Q2,ny Q3,ny
Yny X2 Q1,2,ny Q2,2,ny Q3,2,ny
...
...
Yny Xnx Q1,ny,ny Q2,ny,ny Q3,ny,ny
```

where **nx** and **ny** are integers indicating the number of points on the grid describing the zone to contour. $X_{1..nx}, Y_{1..ny}$ are reals and are the coordinates of the quantities Q1, Q2 and Q3 (reals) on the grid.

#FIELD4

This is a tag describing a zone with **four** quantities to contour. Multiple fields can exist in a .CPV file. A field can have a descriptor immediately following its tag on the same line and before the (n). The descriptor is optional and is read as a string.

Format:

```
#FIELD4 [descriptor]
nx ny
Y1 X1 Q11,1 Q21,1 Q31,1 Q41,1
Y1 X2 Q12,1 Q22,1 Q32,1 Q42,1
...
...
Y1 Xnx Q1nx,1 Q2nx,1 Q3nx,1 Q4nx,1
...
...
Yny X1 Q11,ny Q21,ny Q31,ny Q41,ny
Yny X2 Q12,ny Q22,ny Q32,ny Q42,ny
...
...
Yny Xnx Q1nx,ny Q2nx,ny Q3nx,ny Q4nx,ny
```

where **nx** and **ny** are integers indicating the number of points on the grid describing the zone to contour. $X_{1..nx}, Y_{1..ny}$ are reals and are the coordinates of the quantities Q1, Q2, Q3 and Q4 (reals) on the grid.

#FIELD5

This is a tag describing a zone with **five** quantities to contour. Multiple fields can exist in a .CPV file. A field can have a descriptor immediately following its tag, on the same line and before the (n). The descriptor is optional and read as a string.

Format:

```
#FIELD5 [descriptor]
nx ny
Y1 X1 Q11,1 Q21,1 Q31,1 Q41,1 Q51,1
Y1 X2 Q12,1 Q22,1 Q32,1 Q42,1 Q52,1
...
...
Y1 Xnx Q1nx,1 Q2nx,1 Q3nx,1 Q4nx,1 Q5nx,1
...
...
Yny X1 Q11,ny Q21,ny Q31,ny Q41,ny Q51,ny
```

```

Yny X2 Q12,ny Q22,ny Q32,ny Q42,ny Q52,ny
...
...
Yny Xnx Q1nx,ny Q2nx,ny Q3nx,ny Q4nx,ny Q5nx,ny

```

where **nx** and **ny** are integers indicating the number of points on the grid describing the zone to contour. $X_{1..nx}, Y_{1..ny}$ are reals and are the coordinates of the quantities Q1, Q2, Q3, Q4 and Q5 (reals) on the grid.

#MARKER

A tag describing markers or special points in the field to contour (exp. particles, vortices ...). Each marker is described by its position **X Y**, and a value **I** representing its intensity. The intensity is used to determine the size and the color of the marker. Only one marker tag is allowed in .CPV file. (in the case of the existence of multiple 'markers' DF_CONTOUR will generate an error and stops reading the file).

Format:

```

#MARKER
n
X1 Y1 I1
X2 Y2 I2
...
...
Xn Yn In

```

where **X**, **Y** and **I** are reals, and **n** an integer describing the number of following markers.

‘CPV’ EXAMPLES**EXAMPLE 1**

#TITLE

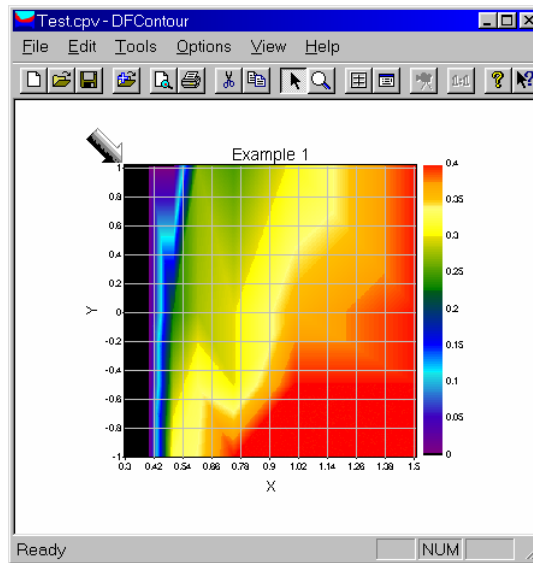
Example 1

#COMMENT

Estimated Pressures on a Plate

#FIELD1 Pressure

7	4	
.300	-1.0	0
.400	-1.0	0
.500	-1.0	0.33
.600	-1.0	0.34
.750	-1.0	0.4
1.000	-1.0	0.4
1.500	-1.0	0.4
.300	-0.5	0
.400	-0.5	0
.500	-0.5	0.28
.600	-0.5	0.33
.750	-0.5	0.3
1.000	-0.5	0.4
1.500	-0.5	0.4
.300	0.0	0
.400	0.0	0
.500	0.0	0.23
.600	0.0	0.28
.750	0.0	0.3
1.000	0.0	0.36
1.500	0.0	0.4
.300	1.0	0
.400	1.0	0
.500	1.0	0
.600	1.0	0.27
.750	1.0	0.25
1.000	1.0	0.31
1.500	1.0	0.4



EXAMPLE 2

#TITLE

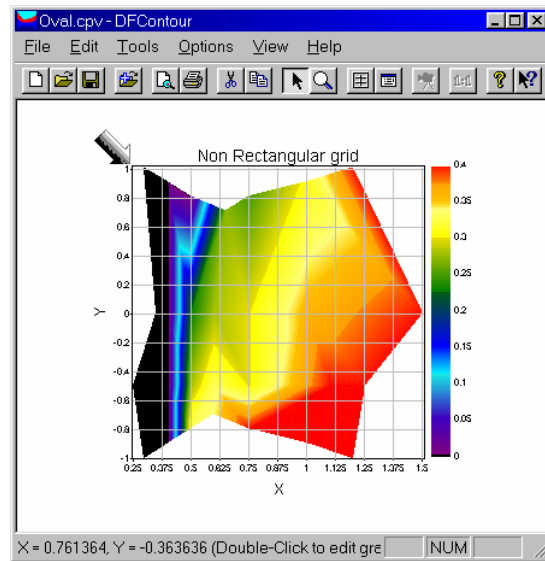
Non Rectangular Grid

#FIELD1 pressure

```

7      4
.300  -1.00  0
.400  -0.90  0
.500  -0.8   0.33
.600  -0.7   0.34
.750  -0.8   0.4
1.000 -0.9   0.4
1.200 -1.00  0.4
.250  -0.5   0
.400  -0.5   0
.500  -0.5   0.28
.600  -0.5   0.33
.750  -0.5   0.3
1.100 -0.5   0.4
1.250 -0.5   0.4
.350   0.0   0
.400   0.0   0
.500   0.0   0.23
.600   0.0   0.28
.750   0.0   0.3
1.000   0.0   0.36
1.500   0.0   0.4
.300   1.0   0
.400   0.9   0
.500   0.8   0
.650   0.7   0.27
.750   0.8   0.25
1.000   0.9   0.31
1.200   1.0   0.4

```



EXAMPLE 3

#contour outline1

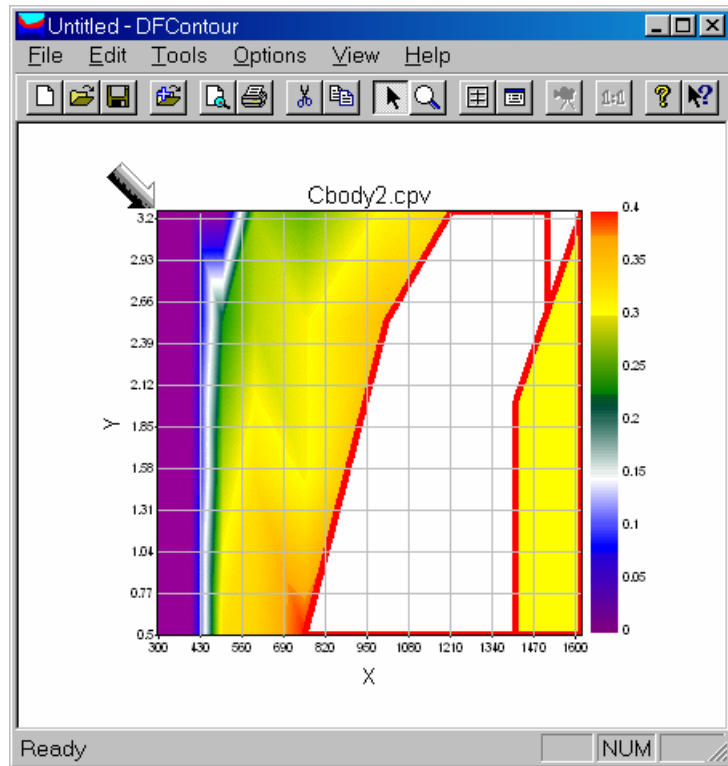
6
 750 0.5
 1000 2.5
 1200 3.2
 1500 3.2
 1500 0.5
 750 0.5

#contour outline2

5
 1400 0.5
 1400 2.0
 1600 3.2
 1600 0.5
 1400 0.5

#pressvel pressure-velocity

7	4			
300	0.5	0	0	0
400	0.5	0	0	0
500	0.5	0.33	0	0
600	0.5	0.34	0	0
750	0.5	0.4	0	0
1000	0.5	0.4	0	0
1500	0.5	0.4	0	0
300	1.5	0	0	0
400	1.5	0	0	0
500	1.5	0.28	0	0
600	1.5	0.33	0	0
750	1.5	0.3	0	0
1000	1.5	0.4	0	0
1500	1.5	0.4	0	0
300	2.5	0	0	0
400	2.5	0	0	0
500	2.5	0.23	0	0
600	2.5	0.28	0	0
750	2.5	0.3	0	0
1000	2.5	0.36	0	0
1500	2.5	0.4	0	0
300	3.2	0	0	0
400	3.2	0	0	0
500	3.2	0	0	0
600	3.2	0.27	0	0
750	3.2	0.25	0	0
1000	3.2	0.31	0	0
1500	3.2	0.4	0	0

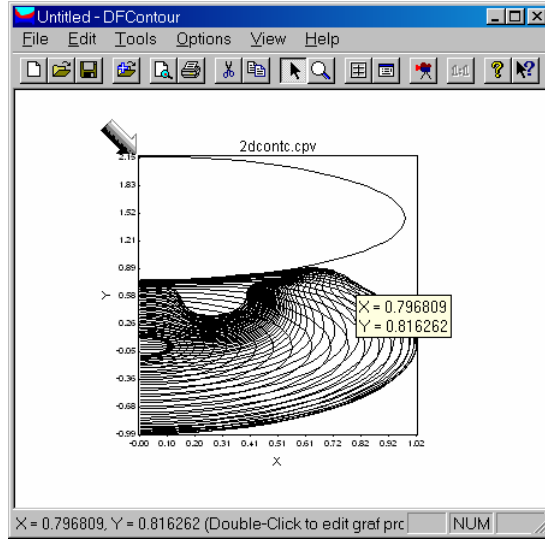


EXAMPLE 4 (2DCONT.CPV)

Please note the file is not completely listed in the documentation. You can locate this file in Examples\2dcontc.cpv

#OUTLINE *Body1*

```
33
0.0000000E+00  0.1055587
1.0346569E-02  0.1050504
2.0593498E-02  0.1035305
3.0642096E-02  0.1010134
4.0395595E-02  9.7523563E-02
```

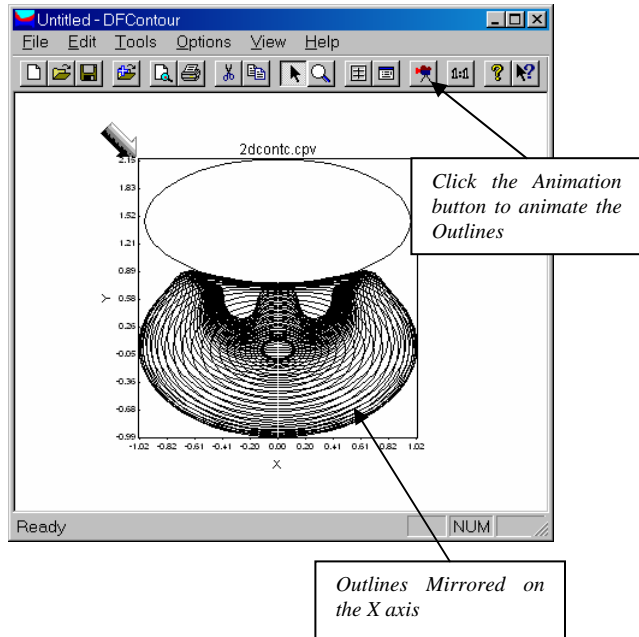


#OUTLINE *Bubble1*

```
41
0.0000000E+00  2.147926
7.6775670E-02  2.145771
0.1530780      2.139320
0.2284365      2.128613
0.3023867      2.113716
0.3744725      2.094721
0.4442496      2.071743
```

#OUTLINE *Body233*

```
33
0.0000000E+00  0.7397121
5.1427346E-02  0.7438111
0.1029342      0.7468863
0.1543137      0.7516404
0.2054772      0.7582446
0.2562981      0.7671769
```



#OUTLINE *Bubble233*

```
41
0.0000000E+00  2.147926
7.6775670E-02  2.145771
0.1530780      2.139320
0.2284365      2.128613
0.3023867      2.113716
0.3744725      2.094721
0.4442496      2.071743
```

APPENDIX B

DF_CONTOUR DOCUMENT FILE FORMAT

DF_CONTOUR documents are based on the Initialization files. Initialization files are easy to create and manage, and are simple ASCII files.

Initialization files are organized in ‘**Sections**’ and ‘**Keys**’. ‘**Sections**’ are always between square brackets and play the role of headers for ‘**Keys**’. For example the following paragraph describes a ‘**Section**’ named **General** with a ‘**Key**’ named **version** with a value equal to **2** and another ‘**Key**’ named **Comment** with the value **DF_CONTOUR**:

```
[General]
version=2.0
Comment=DF_CONTOUR
```

The following table describes DF_CONTOUR Sections and Keys.

[GENERAL] Section

Key	Type	Default value
Version	<i>Real</i>	2.0
NumberOfGrafts	<i>Integer</i>	1
NumberOfCols	<i>Integer</i>	1
NumberOfRows	<i>Integer</i>	1
PrintHeader	<i>String</i>	empty string
PrintFooter	<i>String</i>	empty string

16 GRAF sections are allowed [GRAF0], [GRAF1], ..., GRAF[15]

Key	Type	Default value
FileName	<i>String</i>	empty string
FontName	<i>String</i>	Arial
Title	<i>String</i>	empty string
UnitLabel	<i>String</i>	empty string
XScaleFormat	<i>String</i>	%g
YScaleFormat	<i>String</i>	%g
ColorScaleFormat	<i>String</i>	%.3f
XLabel	<i>String</i>	X axis
YLabel	<i>String</i>	Y axis
LeftLabel	<i>String</i>	empty string
RightLabel	<i>String</i>	empty string
VisibleTitle	<i>Boolean</i>	1
VisibleLeftLabel	<i>Boolean</i>	0
VisibleRightLabel	<i>Boolean</i>	0
VisibleUnitLabel	<i>Boolean</i>	1
VisibleColorScale	<i>Boolean</i>	1
VisibleScaleOnX	<i>Boolean</i>	1
VisibleScaleOnY	<i>Boolean</i>	1

VisibleScaleOnXValue	<i>Boolean</i>	1
VisibleScaleOnYValue	<i>Boolean</i>	
VisibleLegendOnX	<i>Boolean</i>	1
VisibleLegendOnY	<i>Boolean</i>	1
VisibleGrid	<i>Boolean</i>	1
Xmin	<i>Real</i>	-1
Xmax	<i>Real</i>	1
Ymin	<i>Real</i>	-1
Ymax	<i>Real</i>	1
NumberOfFields	<i>Integer</i>	0
<i>n and k are integers and represent respectively the #FIELD and #OUTLINE described in a .CPV file.</i>		
FLD-Name(n)	<i>String</i>	Field
FLD-Visible(n)	<i>Boolean</i>	1
FLD-MeshVisible(n)	<i>Boolean</i>	0
FLD-nColumns(n)	<i>Integer</i>	1
FLD-Min(k)-(n)	<i>Real</i>	-1
FLD-Max(k)-(n)	<i>Real</i>	1
FLD-ScalarField(n)	<i>Boolean</i>	1
FLD-ScalarField(X)(n)	<i>Integer</i>	1
FLD-VectorField(n)	<i>Boolean</i>	0
FLD-VectorField(X)(n)	<i>Integer</i>	2
FLD-VectorField(Y)(n)	<i>Integer</i>	3
FLD-ShowVelocityVectors(n)	<i>Boolean</i>	0
FLD-VelVector(X)(n)	<i>Integer</i>	2
FLD-VelVector(y)(n)	<i>Integer</i>	3
FLD-iso-lines(n)	<i>Boolean</i>	0
FLD-iso-lines-thickness(n)	<i>Integer</i>	4
FLD-VV-ArrowThickness(n)	<i>Integer</i>	1
FLD-VV-ArrowColor(n)	<i>Long integer</i>	16777215 ¹
FLD-VV-ArrowXStep(n)	<i>Integer</i>	4
FLD-VV-ArrowYStep(n)	<i>Integer</i>	4
FLD-VV-ArrowSizingFactor(n)	<i>Real</i>	1
NumberOfOutlines	<i>Integer</i>	0
OTL-Name(m)	<i>String</i>	Outline
OTL-Visible(m)	<i>Boolean</i>	1
OTL-SimmX(m)	<i>Boolean</i>	0
OTL-Filled(m)	<i>Boolean</i>	0
OTL-Thickness(m)	<i>Integer</i>	4
OTL-Color(m)	<i>Long integer</i>	0 ¹
OTL-FillColor(m)	<i>Long integer</i>	255 ¹
PalInd(0)	<i>Long integer</i>	0
...	<i>Long integer</i>	...
PalInd(255)	<i>Long integer</i>	16777215 ¹

‘.STG’ EXAMPLE

```
; *****
; DF_Contour Version 2.0 Document File
; DF_Contour Copyright © Dynaflo, Inc. 1997, 98. All rights reserved.
;
; Date: Tuesday 11/20/1997 14:11:54
;
; *****
```

[GENERAL]

```
Version=2
NumberOfGrafts=1
NumberOfCols=1
NumberOfRows=1
PrintHeader=
PrintFooter=
```

[GRAF0]

```
FileName=Test.cpv
FontName=Arial
Title=Test file
UnitLabel=psi
XScaleFormat=%g
YScaleFormat=%g
ColorScaleFormat=%g
XLabel=X
YLabel=Y
LeftLabel=
RightLabel=
VisibleTitle=1
VisibleLeftLabel=0
VisibleRightLabel=0
VisibleUnitLabel=1
VisibleColorScale=1
VisibleScaleOnX=1
VisibleScaleOnY=1
VisibleScaleOnXValue=1
VisibleScaleOnYValue=1
VisibleLegendOnX=1
VisibleLegendOnY=1
VisibleGrid=1
Xmin=0.3
Xmax=1.5
Ymin=-1
Ymax=1
NumberOfFields=1
FLD-Name(0)=pressure-velocity
FLD-Visible(0)=1
FLD-MeshVisible(0)=0
```

FLD-nColumns(0)=1
FLD-Min(0)-(0)=0
FLD-Max(0)-(0)=0.4
FLD-Min(1)-(0)=-6.27744e+066
FLD-Max(1)-(0)=-6.27744e+066
FLD-Min(2)-(0)=-6.27744e+066
FLD-Max(2)-(0)=-6.27744e+066
FLD-Min(3)-(0)=-6.27744e+066
FLD-Max(3)-(0)=-6.27744e+066
FLD-Min(4)-(0)=-6.27744e+066
FLD-Max(4)-(0)=-6.27744e+066
FLD-ScalarField(0)=1
FLD-ScalarField(X)(0)=0
FLD-VectorField(0)=0
FLD-VectorField(X)(0)=1
FLD-VectorField(Y)(0)=2
FLD-ShowVelocityVectors(0)=0
FLD-VelVector(X)(0)=1
FLD-VelVector(y)(0)=2
FLD-iso-lines(0)=0
FLD-iso-lines-thickness(0)=4
FLD-VV-ArrowThickness(0)=2
FLD-VV-ArrowColor(0)=16777215
FLD-VV-ArrowXStep(0)=4
FLD-VV-ArrowYStep(0)=4
FLD-VV-ArrowSizingFactor(0)=1
NumberOfOutlines=0
PalInd(0)=8388736
PalInd(1)=8519806
PalInd(2)=8650876
...
...
PalInd(251)=10495
PalInd(252)=8447
PalInd(253)=6399
PalInd(254)=4351
PalInd(255)=255

APPENDIX C

PRINTF FORMAT SPECIFICATION

A format specification, which consists of optional and required fields and has the following form:

%[flags] [width] [.precision] type

Each field of the format specification is a single character or a number signifying a particular format option. The simplest format specification contains only the percent sign and a type character (for example, %f).

The optional fields, which appear before the type character, control other aspects of the formatting, as follows:

- *flags*: Optional character or characters that control justification of output and printing of signs, blanks, and decimal points.
- *width*: Optional number that specifies the minimum number of characters output.
- *precision*: Optional number that specifies the maximum number of characters printed for all or part of the output field, or the minimum number of digits printed for integer values.
- *type*: Required character that determines whether the associated argument is interpreted as a character, a string, or a number.

FLAG

The first optional field of the format specification is *flags*. A flag directive is a character that justifies output and prints signs, blanks and decimal points. (*see Table below*).

Flag	Meaning	Default
-	Left align the result within the given field width.	Right align
+	Prefix the output value with a sign (+ or -) if the output value is of a signed type.	Sign appears only for negative signed values
0	If width is prefixed with 0, zeros are added until the minimum width is reached. If 0 and - appear, the 0 is ignored.	No Padding.
blank (' ')	Prefix the output value with a blank if the output value is signed and positive; the blank is ignored if both the blank and + flags appear.	No blank appears.
#	When used with the e, E, or f format, the # flag forces the output value to contain a decimal point in all cases.	Decimal point appears only if digits follow it.
#	When used with the g or G format, the # flag forces the output value to contain a decimal point in all cases and prevents the truncation of trailing zeros.	Decimal point appears only if digits follow it. Trailing zeros are truncated.

WIDTH

The second optional field of the format specification is the width specification. The width argument is a non-negative decimal integer controlling the minimum number of characters printed. If the number of characters in the output value is less than the specified width, blanks are added to the left or the right of the values — depending on whether the – flag (for left alignment) is specified — until the minimum width is reached. If width is prefixed with 0, zeros are added until the minimum width is reached (not useful for left-aligned numbers).

The width specification never causes a value to be truncated. If the number of characters in the output value is greater than the specified width, or if width is not given, all characters of the value are printed (subject to the precision specification).

If the width specification is an asterisk (*), an integer argument from the argument list supplies the value. The width argument must precede the value being formatted in the argument list. A nonexistent or small field width does not cause the truncation of a field; if the result of a conversion is wider than the field width, the field expands to contain the conversion result.

.PRECISION

The third optional field of the format specification is the precision specification. It specifies a nonnegative decimal integer, preceded by a period (.), which specifies the number of characters to be printed, the number of decimal places, or the number of significant digits (*see Table 2*). Unlike the width specification, the precision specification can cause either truncation of the output value or rounding of a floating-point value.

Precision	Meaning	Default
E, e	The precision specifies the number of digits to be printed after the decimal point. The last printed digit is rounded.	Default precision is 6; if precision is 0 or the period (.) appears without a number following it, no decimal point is printed.
f	The precision value specifies the number of digits after the decimal point. If a decimal point appears, at least one digit appears before it. The value is rounded to the appropriate number of digits.	Default precision is 6; if precision is 0, or if the period (.) appears without a number following it, no decimal point is printed.
G, g	The precision specifies the maximum number of significant digits printed.	Six significant digits are printed, with any trailing zeros truncated.

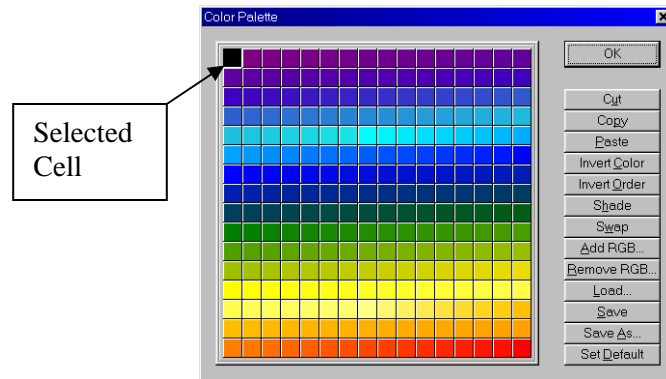
TYPE

The type character is the only required format field ; it appears after any optional format fields. The type character determines whether the associated argument is interpreted as a character, string, or number.

Character	Type	Output Format
e	double	Signed value having the form [-] d. dddd e [sign] ddd where d is a single decimal digit, dddd is one or more decimal digits, ddd is exactly three decimal digits, and sign is + or -.
E	double	Identical to the e format except that E rather than e introduces the exponent.
f	double	Signed value having the form [-] dddd. dddd, where dddd is one or more decimal digits. The number of digits before the decimal point depends on the magnitude of the number, and the number of digits after the decimal point depends on the requested precision.
g	double	Signed value printed in f or e format, whichever is more compact for the given value and precision. The e format is used only when the exponent of the value is less than -4 or greater than or equal to the precision argument. Trailing zeros are truncated, and the decimal point appears only if one or more digits follow it.
G	double	Identical to the g format, except that E, rather than e, introduces the exponent (where appropriate).

APPENDIX D

THE COLOR PALETTE



DF_CONTOUR uses color palettes for the representation of color contours. With this option you can create new color palettes and edit existing ones. DF_CONTOUR is delivered with a variety of previously selected color palettes installed in the 'PAL' directory under the program path.

Each color palette is composed on 256 different entries that you can edit individually or by group. To select a color entry, click on the entry with the mouse. Click and drag to select multiple entries.

- Cut: Cuts the selected entries and stores a copy in the clipboard.
- Copy: Copies the selected entries to the clipboard.
- Paste: Pastes from the clipboard a previously Cut or Copied entries.
- Invert Color: Inverts the color on the selected entries.
- Invert Order: Inverts the order of the selected entries so the 1st one becomes the last one and the last one becomes the 1st one.
- Shade: Gradually changes the color in a selection from the selected 1st entry to the selected last entry. To make a color palette with shades of gray; change the color of the 1st entry to Black, change the color of the last entry to White, select all the color entries and click Shade.
- Swap: Swaps color entries. This operation is done by making a selection, clicking swap and using the mouse clicking at the desired swap color cell. For example to swap the first 16 entries with the last ones, select the first row of entries, click swap and click the first column in the last row of the color entries.
- Add RGB...: Adds a certain amount of Red, Green and Blue to the selected cells.
- Remove RGB...: Removes a certain amount of Red, Green and Blue from the selected cells.
- Load...: Loads a color palette from a previously saved color palette file.
- Save: Saves a color palette to a file.
- Save As...: Saves a color palette to a file using a different name.
- Set Default: The current color palette will be set as the default color palette. DF_CONTOUR will assign that color palette to newly created contours.