

pstricks-add

additional Macros for pstricks*

v.2.24

Herbert Voß

November 12, 2004

Abstract

This version of `pstricks-add` needs `pstricks.tex` version >1.04 from June 2004, otherwise the additional macros may not work as expected. The ellipsis material and the option `asolid` (renamed to `eofill`) are now part of the new `pstricks.tex` package, available at CTAN or at <http://perce.de/LaTeX/pstricks>. `pstricks-add` will forever be experimental, try it at your own risk.

- It is important to load `pstricks-add` as **last** PSTricks related package, otherwise a lot of the macros won't work in the expected way.
- `pstricks-add` uses the extended version of the `keyval` package. So be sure, that you have installed `pst-xkey` which is part of the `xkeyval`-package and that all packages, that uses the old `keyval` interface are loaded **before** the `xkeyval`.

Contents

I	<code>pstricks</code>	5
1	Numeric functions	5
1.1	<code>\pst@divide</code>	5
1.2	<code>\pst@mod</code>	5
1.3	<code>\pst@max</code>	6
1.4	<code>\pst@maxdim</code>	6

*This document was written with Kile: 1.7 (Qt: 3.1.1; KDE: 3.3; <http://sourceforge.net/projects/kile/>) and the PDF output was build with VTeX/Free (<http://www.micropress-inc.com/linux>)

1.5	<code>\pst@abs</code>	6
1.6	<code>\pst@absdim</code>	6
2	Dashed Lines	7
3	<code>\rmultiput</code> , a multiple <code>\rput</code>	7
4	<code>\pslineII</code> Colored lines	8
4.1	The options	8
4.2	Examples	9
5	<code>\pslineIII</code> Variable linewidth	10
5.1	The options	11
5.2	Examples	11
6	<code>\psbrace</code>	12
6.1	Syntax	12
6.2	Options	12
6.3	Examples	13
7	Random dots	17
8	Arrows	19
8.1	Definition	19
8.2	Multiple arrows	19
8.3	<code>hookrightarrow</code> and <code>hookleftarrow</code>	20
8.4	<code>ArrowInside</code> Option	21
8.5	<code>ArrowFill</code> Option	22
8.6	Examples	23
8.6.1	<code>\psline</code>	23
8.6.2	<code>\pspolygon</code>	25
8.6.3	<code>\psbezier</code>	27
8.6.4	<code>\pcline</code>	29
8.6.5	<code>\pccurve</code>	30
9	<code>\psFormatInt</code>	30

II	pst-node	31
10	\nclineII	31
10.1	The options	31
10.2	Examples	31
11	\pclineII	32
12	\ncdiag and \pcdiag	32
13	\ncdiagg and \pcdiagg	34
14	\ncbarr	36
15	\psRelLine	36
16	\psParallelLine	40
17	\psIntersectionPoint	41
18	\psLNode and \psLCNode	42
III	pst-plot	44
19	New options	44
19.1	algebraic	45
19.2	comma	47
19.3	xyAxes, xAxis and yAxis	48
19.4	xyDecimals, xDecimals and yDecimals	49
19.5	xyLabel, xLabel and yLabel	50
19.6	tickstyle	50
19.7	ticks	51
19.8	labels	52
19.9	ticksize, xticksize, yticksize	53
19.10	subticks	54
19.11	subticksize, xsubticksize, ysubticksize	55
19.12	tickcolor, subtickcolor	56

19.13	ticklinestyle and subticklinestyle	57
19.14	loglines	57
19.15	xylogBase, xlogBase and ylogBase	59
19.15.1	xylogBase	59
19.15.2	ylogBase	60
19.15.3	xlogBase	62
19.15.4	No logstyle (xylogBase={})	63
19.16	subticks, tickwidth and subtickwidth	64
19.17	xlabelFactor and ylabelFactor	69
19.18	Plot style bar and option barwidth	70
19.19	New options for \readdata	71
20	New options for \listplot	71
20.1	Example for nStep/xStep	72
20.2	Example for nStart/xStart	73
20.3	Example for nEnd/xEnd	74
20.4	Example for all new options	74
20.5	Example for xStart	75
20.6	Example for yStart/yEnd	76
20.7	Example for plotNo/plotNoMax	77
21	Polar plots	78
22	New commands and environments	80
22.1	\pstScalePoints	80
22.2	psgraph environment	81
22.2.1	The new options	85
22.3	\resetOptions	86
23	Credits	87
24	Change log	87

Part I

pstricks

1 Numeric functions

All macronames contain a @ in their name, because they are only for internal use, but it is no problem to use it as the other macros. One can define another name without a @:

```
\makeatletter
\let\pstdivide\pst@divide
\makeatother
```

or put the macro inside of the \makeatletter – \makeatother sequence.

1.1 \pst@divide

pstricks itself has its own divide macro, called \pst@divide which can divide two lengths and saves the quotient as a floating point number:

```
\pst@divide{<dividend>}{<divisor>}{<result as a macro>}
```

5.66666
-0.17647

```
1 \makeatletter
2 \pst@divide{34pt}{6pt}\quotient \quotient\
3 \pst@divide{-6pt}{34pt}\quotient \quotient
4 \makeatother
```

this gives the output 5.66666. The result is not a length!

1.2 \pst@mod

pstricks-add defines an additional numeric function for the modulus:

```
\pst@mod{<integer>}{<integer>}{<result as a macro>}
```

4
1

```
1 \makeatletter
2 \pst@mod{34}{6}\modulo \modulo\
3 \pst@mod{25}{-6}\modulo \modulo
4 \makeatother
```

this gives the output 4. Using this internal numeric functions in documents requires a setting inside the makeatletter and makeatother environment. It makes some sense to define a new macroname in the preamble to use it throughou, e.g. \let\modulo\pst@mod.

1.3 \pst@max

`\pst@max{<integer>}{<integer>}{<result as count register>}`

```
-6      1 \newcount\maxNo
11      2 \makeatletter
        3 \pst@max{-34}{-6}\maxNo \the\maxNo\\
        4 \pst@max{0}{11}\maxNo \the\maxNo
        5 \makeatother
```

1.4 \pst@maxdim

`\pst@maxdim{<dimension>}{<dimension>}{<result as dimension register>}`

```
1234.0pt 1 \newdimen\maxDim
967.39369pt 2 \makeatletter
          3 \pst@maxdim{34cm}{1234pt}\maxDim \the\maxDim\\
          4 \pst@maxdim{34cm}{123pt}\maxDim \the\maxDim
          5 \makeatother
```

1.5 \pst@abs

`\pst@abs{<integer>}{<result as a count register>}`

```
34      1 \newcount\absNo
4        2 \makeatletter
        3 \pst@abs{-34}\absNo \the\absNo\\
        4 \pst@abs{4}\absNo \the\absNo
        5 \makeatother
```

1.6 \pst@absdim

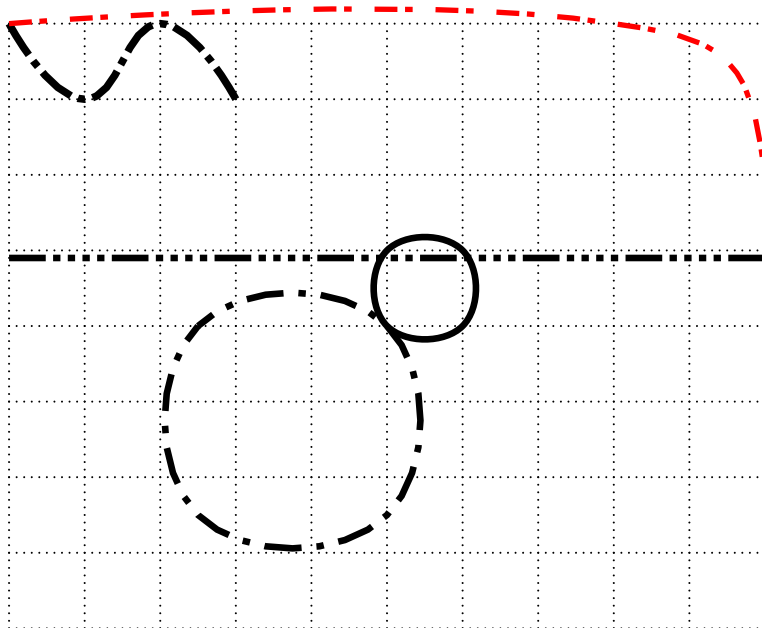
`\pst@absdim{<dimension>}{<result as a dimension register>}`

```
967.39369pt 1 \newdimen\absDim
0.00006pt 2 \makeatletter
          3 \pst@absdim{-34cm}\absDim \the\absDim\\
          4 \pst@absdim{4sp}\absDim \the\absDim
          5 \makeatother
```

2 Dashed Lines

Tobias Nähring implemented an enhanced feature for dashed lines. The number of arguments is no more limited.

`dash=value1[unit] value2[unit] ...`



```

1 \begin{pspicture}(-5,-4)(5,4)
2   \psset{linewidth=2.5pt}
3   \psgrid[subgriddiv=0,griddots=10,gridlabels=0pt]
4   \psset{linestyle=dashed}
5   \pscurve[dash=5mm 1mm 1mm 1mm,linewidth=0.1](-5,4)(-4,3)(-3,4)(-2,3)
6   \psline[dash=5mm 1mm 1mm 1mm 1mm 1mm 1mm 1mm 1mm 1mm](-5,0.9)(5,0.9)
7   \psccurve[linestyle=solid](0,0)(1,0)(1,1)(0,1)
8   \psccurve[linestyle=dashed,dash=5mm 2mm 0.1 0.2,linetype=0](0,0)(-2.5,0)
9   (-2.5,-2.5)(0,-2.5)
10  \pscurve[dash=3mm 3mm 1mm 1mm,linecolor=red,linewidth=2pt](5,-4)(5,2)
    (4.5,3.5)(3,4)(-5,4)
11 \end{pspicture}

```

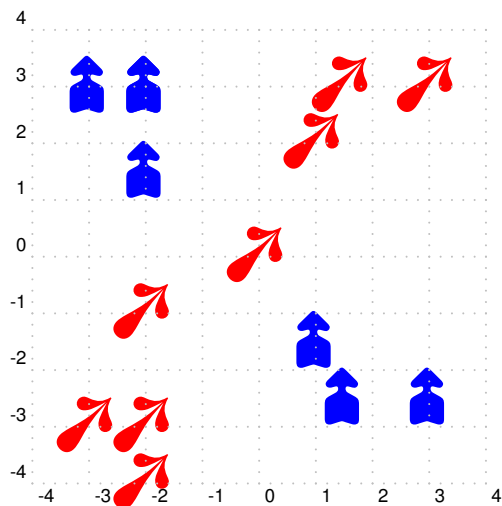
3 \rmultiput, a multiple \rput

PSTricks already knows a `multirput`, which puts a box n times with a difference of dx and dy relative to each other. It is not possible to put it with a different distance from one point to the next one. This is possible with `rmultiput`:

```

\rmultiput[<options>]{<any material>}(x1,y1)(x2,y2) ... (xn,yn)
\rmultiput*[<options>]{<any material>}(x1,y1)(x2,y2) ... (xn,yn)

```



```

1 \psset{unit=0.75}
2 \begin{pspicture}(-4,-4)(4,4)
3 \rmultitup[rot=45]{\red\psscalebox{3}{\ding
  {250}}}%
4   (-2,-4)(-2,-3)(-3,-3)(-2,-1)(0,0)(1,2)
   (1.5,3)(3,3)
5 \rmultitup[rot=90,ref=1C]{\blue\psscalebox
  {2}{\ding{253}}}%
6   (-2,2.5)(-2,2.5)(-3,2.5)(-2,1)(1,-2)
   (1.5,-3)(3,-3)
7 \psgrid[subgriddiv=0,gridcolor=lightgray]
8 \end{pspicture}

```

4 \pslineII Colored lines

The dashed lines are by default black and white lines. The new macro `\pslineII` offers two-color lines and has the same syntax as `\psline`.



```

1 \begin{pspicture}(0,-0.5)(12,0.5)
2 \pslineII[linewidth=5pt,arrowscale=2]{o-o}(0,0)(12,0)
3 \end{pspicture}

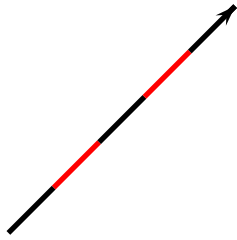
```

4.1 The options

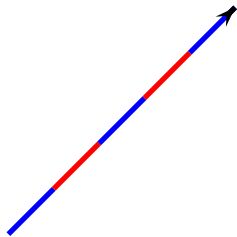
name	meaning
<code>dashColorI</code>	first color, default is black
<code>dashColorII</code>	second color, default is red
<code>dashNo</code>	the difference in per cent of the colored lines, default is 0.2
<code>linecap</code>	how two lines are connected. 0: no modification 1: rounded edges 2: an additional half square at both ends

`dashNo` can have values greater than 1. In this case the value will be taken as an absolute width in the pt unit. Only this unit is possible!

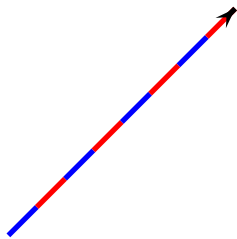
4.2 Examples



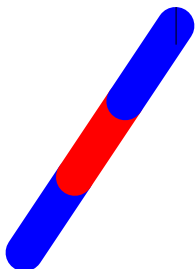
```
1 \psset{linewidth=2pt}
2 \begin{pspicture}(3,3)
3   \pslineII{->}(0,0)(3,3)
4 \end{pspicture}
```



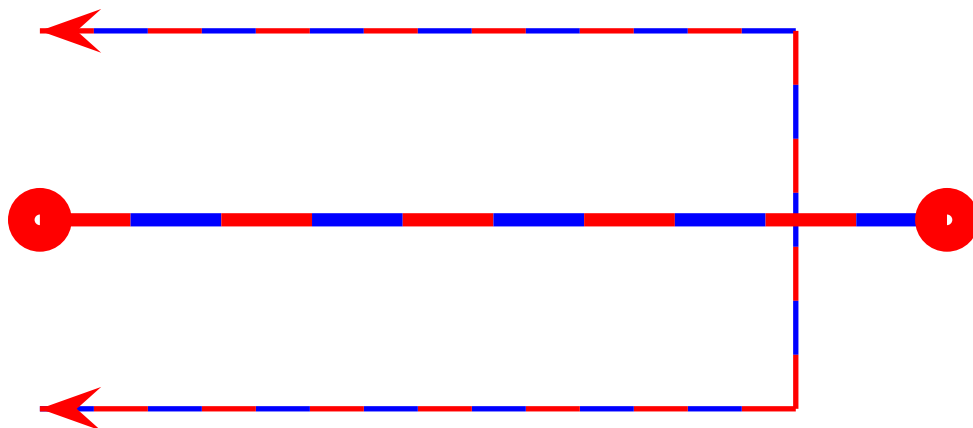
```
1 \psset{linewidth=2pt}
2 \begin{pspicture}(3,3)
3   \pslineII[dashColorI=blue]{->}(0,0)(3,3)
4 \end{pspicture}
```



```
1 \psset{linewidth=2pt}
2 \begin{pspicture}(3,3)
3   \pslineII[dashColorI=blue,dashNo=15]{->}(0,0)(3,3)
4 \end{pspicture}
```



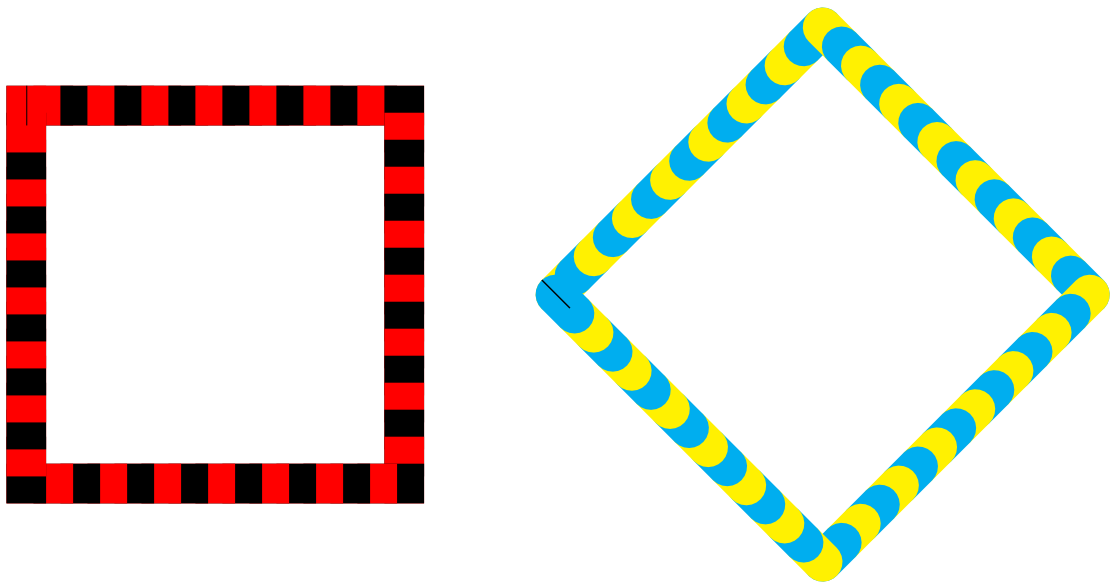
```
1 \psset{linewidth=2pt}
2 \begin{pspicture}(3,3)
3   \pslineII[dashColorI=blue,linecap=1,%
4     dashNo=0.3,linewidth=0.5](0,0)(2,3)
5 \end{pspicture}
```



```

1 \psset{linecolor=red,arrowscale=3}
2 \psset{dashColorI=red,dashColorII=blue,dashNo=20,linewidth=2pt}
3 \begin{pspicture}(0,0)(12,-5)
4 \pslineII{<->}(0,0)(10,0)(10,-5)(0,-5)
5 \pslineII[linewidth=5pt,%
6   dashNo=0.1,arrowscale=2]{o-o}(0,-2.5)(12,-2.5)
7 \end{pspicture}

```



```

1 \psset{linewidth=15pt,dashNo=10}
2 \begin{pspicture}(0,1)(10,-6)
3   \pslineII[linecap=2](0,0)(5,0)(5,-5)(0,-5)(0,0)
4   \rput{45}(7,-2.5){%
5     \pslineII[linecap=1,dashColorI=yellow,%
6       dashColorII=cyan](0,0)(5,0)(5,-5)(0,-5)(0,0)%
7   }
8 \end{pspicture}

```

5 \pslineIII Variable linewidth

By default all lines have a fixed width. `\pslineIII` allows to define the start and the end width of a line. It has the same syntax as `\psline`.



```

1 \pslineIII[wBegin=1cm,wEnd=0.3cm,linecolor=cyan](0,0)(12,0)

```

5.1 The options

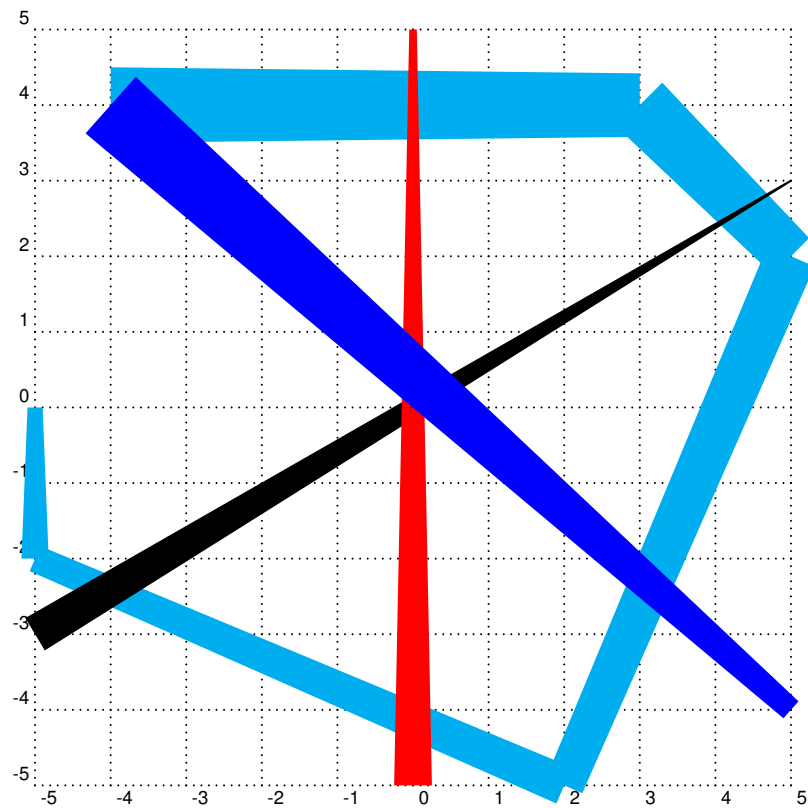
name	meaning
wBegin	first width, default is <code>\pslinewidth</code>
wEnd	last width, default is <code>\pslinewidth</code>

It is also possible to use `pslineIII` with more than two coordinates, like



```
1 \pslineIII[wBegin=1cm,wEnd=0.1cm,linecolor=cyan](0,0)(0,1.5)(12,1.5)
   (12,0)
```

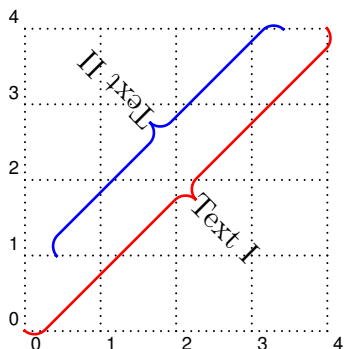
5.2 Examples



6 \psbrace

6.1 Syntax

`\psbrace[<options>](<A>)(){<text>}`



```

1 \begin{pspicture}(4,4)
2 \psgrid[subgriddiv=0,griddots=10]
3 \pnode(0,0){A}
4 \pnode(4,4){B}
5 \psbrace[linecolor=red,ref=lC](A)(B){Text I}
6 \psbrace[linecolor=blue,ref=lC](3,4)(0,1){Text II}
7 \end{pspicture}

```

The option `\specialCoor` is enabled, so that all types of coordinates are possible, (nodename), (x,y) , $(nodeA|nodeB)$, ...

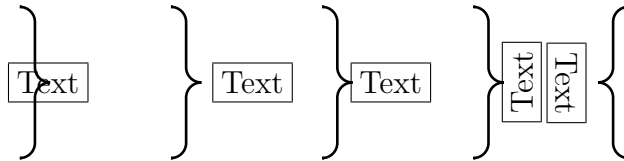
6.2 Options

Additional to all other available options from `pstricks` or the other related packages, there are two new option, named `braceWidth` and `bracePos`. All important ones are shown in the following table.

name	meaning
<code>braceWidth</code>	default is 0.35
<code>bracePos</code>	relative position (default is 0.5)
<code>lineararc</code>	absolute value for the arcs (default is 2mm)
<code>nodesepA</code>	x-separation (default is 0pt)
<code>nodesepB</code>	y-separation (default is 0pt)
<code>rot</code>	additional rotating for the text (default is 0)
<code>ref</code>	reference point for the text (default is c)

By default the text is written perpendicular to the brace line and can be changed with the `pstricks` option `rot=...`. The text parameter can take any object and may also be empty. The reference point can be any value of the combination of **l** (left) or **r** (right) and **b** (bottom) or **B** (Baseline) or **C** (center) or **t** (top), where the default is **c**, the center of the object.

6.3 Examples



```

1 \begin{pspicture}(8,2.5)
2 \psbrace(0,0)(0,2){\fbox{Text}}%
3 \psbrace[nodesepA=20pt](2,0)(2,2){\fbox{Text}}
4 \psbrace[ref=lC](4,0)(4,2){\fbox{Text}}
5 \psbrace[ref=lt,rot=90,nodesepB=-15pt](6,0)(6,2){\fbox{Text}}
6 \psbrace[ref=lt,rot=90,nodesepA=-5pt,nodesepB=15pt](8,2)(8,0){\fbox{Text}}
7 \end{pspicture}

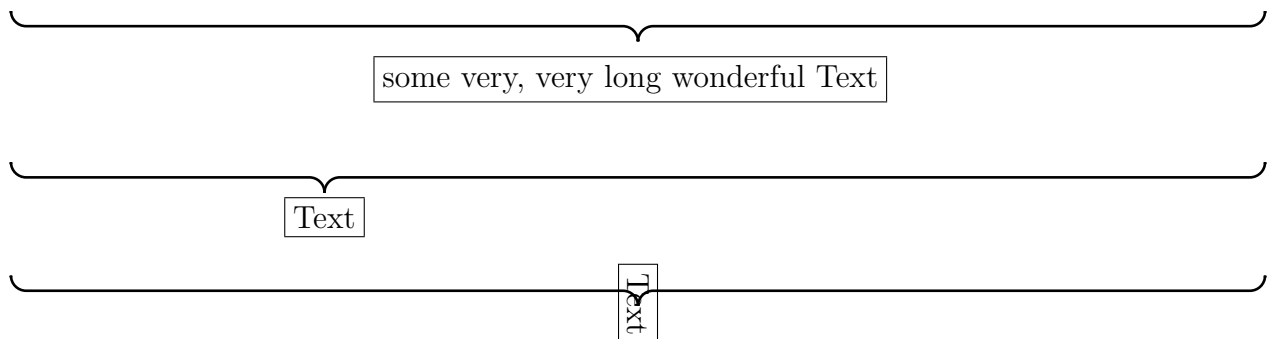
```

$$\left. \int_1^{\infty} \frac{1}{x^2} dx = 1 \right\} \left. \int_1^{\infty} \frac{1}{x^2} dx = \int_1^{\infty} \frac{1}{x^2} dx = \int_8^{\infty} \frac{1}{x^2} dx \right\}$$

```

1 \def\someMath{\int\limits_1^{\infty}\frac{1}{x^2}\,,dx=1$}
2 \begin{pspicture}(8,2.5)
3 \psbrace(0,0)(0,2){\someMath}%
4 \psbrace[nodesepA=30pt](2,0)(2,2){\someMath}
5 \psbrace[ref=lC](4,0)(4,2){\someMath}
6 \psbrace[ref=lt,rot=90,nodesepB=-30pt](6,0)(6,2){\someMath}
7 \psbrace[ref=lt,rot=90,nodesepB=30pt](8,2)(8,0){\someMath}
8 \end{pspicture}

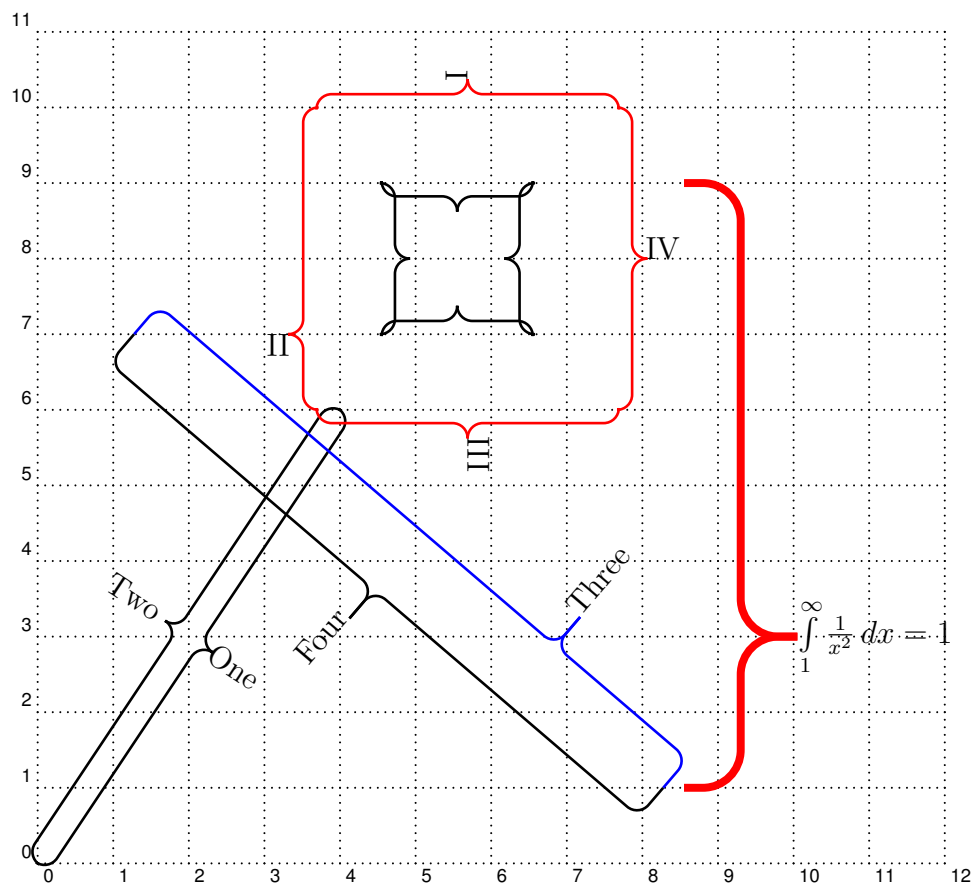
```



```

1 \begin{pspicture}(\linewidth,5)
2 \psbrace(0,0.5)(\linewidth,0.5){\fbox{Text}}%
3 \psbrace[bracePos=0.25,nodesepB=-10pt,rot=90](0,2)(\linewidth,2){\fbox{
  Text}}
4 \psbrace[ref=lC,nodesepA=-3.5cm,nodesepB=-15pt,rot=90](0,4)(\linewidth,4){
  %
  \fbox{some very, very long wonderful Text}}
5 \end{pspicture}
6

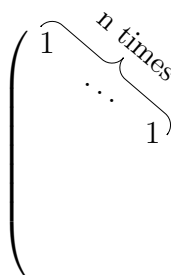
```



```

1 \def\someMath{ $\int\limits_1^{\infty}\frac{1}{x^2}\,dx=1$ }
2 \begin{pspicture}(12,11)
3 \psgrid[subgriddiv=0,griddots=10]
4 \pnode(0,0){A}
5 \pnode(4,6){B}
6 \psbrace[ref=lC](A)(B){One}
7 \psbrace[rot=180,nodesepA=-5pt,ref=rb](B)(A){Two}
8 \psbrace[linecolor=blue,bracePos=0.25,braceWidth=1,ref=lB](8,1)(1,7){Three
9 }
10 \psbrace[braceWidth=-1,rot=180,ref=rB](8,1)(1,7){Four}
11 \psbrace[lineararc=0.5,linecolor=red,linewidth=3pt,braceWidth=1.5,%
12 bracePos=0.25,ref=lC](8,1)(8,9){\someMath}
13 \psbrace(4,9)(6,9){}
14 \psbrace(6,9)(6,7){}
15 \psbrace(6,7)(4,7){}
16 \psbrace(4,7)(4,9){}
17 \psset{linecolor=red}
18 \psbrace[ref=lB](7,10)(3,10){I}
19 \psbrace[ref=lB,bracePos=0.75](3,10)(3,6){II}
20 \psbrace[ref=lB](3,6)(7,6){III}
21 \psbrace[ref=lB](7,6)(7,10){IV}
22 \end{pspicture}

```



```

1 \[
2 \begin{pmatrix}
3 \Rnode[vref=2ex]{A}{~1} \\\
4 & \ddots \\\
5 && \Rnode[href=2]{B}{1} \\\
6 &&& \Rnode[vref=2ex]{C}{0} \\\
7 &&&& \ddots \\\
8 &&&&& \Rnode[href=2]{D}{0}~ \\\
9 \end{pmatrix}
10 \end{pmatrix}
11 \psbrace[linewidth=0.1pt,rot=-90,nodesep=0.2](B)(A){\
12 \small n times}
13 \psbrace[linewidth=0.1pt,rot=-90,nodesep=0.2](D)(C){\
14 \small n times}

```

It is also possible to put a vertical brace around a default paragraph. This works with setting two invisible nodes at the beginning and the end of the paragraph. Indentation is possible with a minipage.

Some nonsense text, which is nothing more than nonsense. Some nonsense text, which is nothing more than nonsense.

Some nonsense text, which is nothing more than nonsense. Some nonsense text, which is nothing more than nonsense. Some nonsense text, which is nothing more than nonsense. Some nonsense text, which is nothing more than nonsense.

nothing more than nonsense. Some nonsense text, which is nothing more than nonsense. Some nonsense text, which is nothing more than nonsense. Some nonsense text, which is nothing more than nonsense.

Some nonsense text, which is nothing more than nonsense. Some nonsense text, which is nothing more than nonsense.

Some nonsense text, which is nothing more than nonsense. Some nonsense text, which is nothing more than nonsense. Some nonsense text, which is nothing more than nonsense. Some nonsense text, which is nothing more than nonsense. Some nonsense text, which is nothing more than nonsense. Some nonsense text, which is nothing more than nonsense. Some nonsense text, which is nothing more than nonsense.

```

1 \begin{framed}
2 Some nonsense text, which is nothing more than nonsense.
3 Some nonsense text, which is nothing more than nonsense.
4
5 \noindent\rnode{A}{
6
7 \vspace*{-1ex}
8 Some nonsense text, which is nothing more than nonsense.
9 Some nonsense text, which is nothing more than nonsense.
10 Some nonsense text, which is nothing more than nonsense.
11 Some nonsense text, which is nothing more than nonsense.
12 Some nonsense text, which is nothing more than nonsense.
13 Some nonsense text, which is nothing more than nonsense.
14 Some nonsense text, which is nothing more than nonsense.
15 Some nonsense text, which is nothing more than nonsense.
16
17 \vspace*{-2ex}
18 \noindent\rnode{B}{\psbrace[linecolor=red](A)(B)}
19
20 Some nonsense text, which is nothing more than nonsense.
21 Some nonsense text, which is nothing more than nonsense.
22
23 \medskip
24 \hfill\begin{minipage}{0.95\linewidth}
25 \noindent\rnode{A}{
26
27 \vspace*{-1ex}
28 Some nonsense text, which is nothing more than nonsense.
29 Some nonsense text, which is nothing more than nonsense.
30 Some nonsense text, which is nothing more than nonsense.
31 Some nonsense text, which is nothing more than nonsense.
32 Some nonsense text, which is nothing more than nonsense.
33 Some nonsense text, which is nothing more than nonsense.
34 Some nonsense text, which is nothing more than nonsense.
35 Some nonsense text, which is nothing more than nonsense.
36

```



```

37 \vspace*{-2ex}
38 \noindent\rnode{B}{\psbrace[linecolor=red](A)(B){}
39 \end{minipage}
40 \end{framed}

```

7 Random dots

The syntax of the new macro `\psRandom` is:

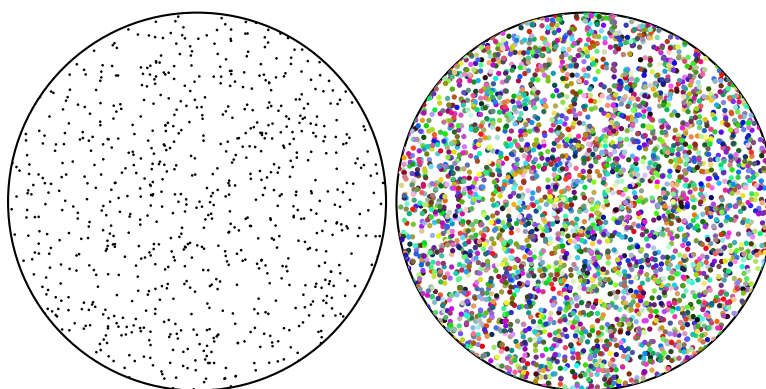
```

\psRandom[<option>]{}
\psRandom[<option>]{<clip path>}
\psRandom[<option>](<xMax,yMax>){<clip path>}
\psRandom[<option>](<xMin,yMin>)(<xMax,yMax>){<clip path>}

```

If there is no area for the dots defined, then $(0,0)$ – $(1,1)$ in the actual scale is used for placing the dots. This area should be greater than the clipping path to be sure that the dots are placed over the full area. The clipping path can be everything. If no clipping path is given, then the frame $(0,0)$ – $(1,1)$ in user coordinates is used. The new options are:

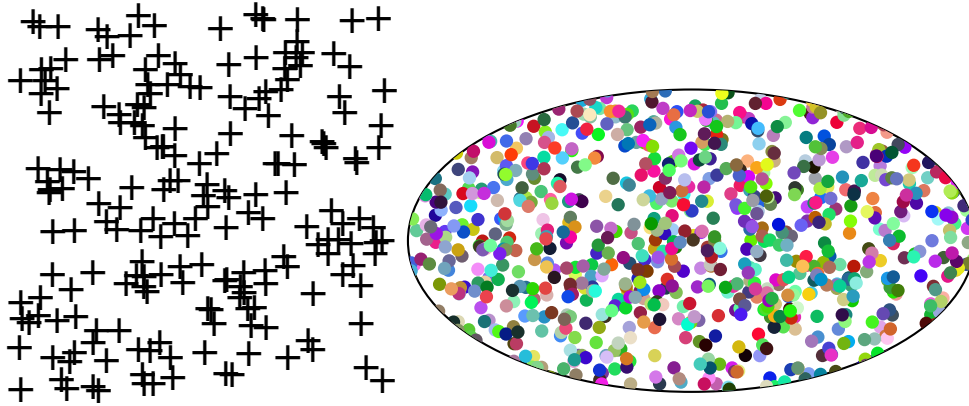
name	default	
<code>randomPoints</code>	1000	number of random dots
<code>color</code>	false	random color



```

1 \psset{unit=5cm}
2 \begin{pspicture}(1,1)
3   \psRandom[dotsize=1pt,fillstyle=solid](1,1){\pscircle(0.5,0.5){0.5}}
4 \end{pspicture}
5 \begin{pspicture}(1,1)
6   \psRandom[dotsize=2pt,randomPoints=5000,color,%
7     fillstyle=solid](1,1){\pscircle(0.5,0.5){0.5}}
8 \end{pspicture}

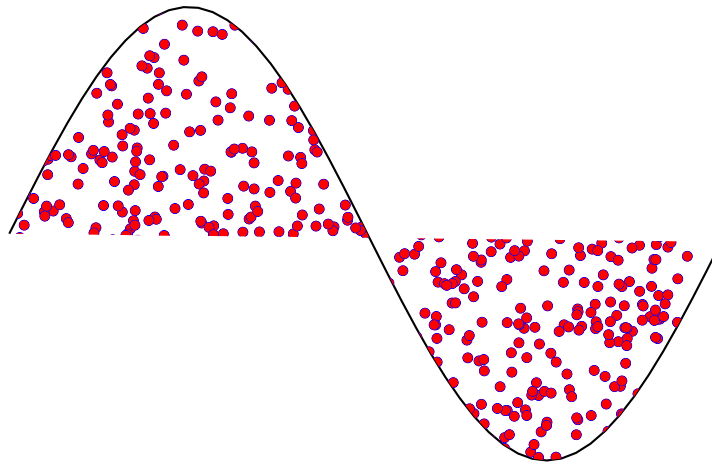
```



```

1 \psset{unit=5cm}
2 \begin{pspicture}(1,1)
3   \psRandom[randomPoints=200,dotsize=8pt,dotstyle=+]{ }
4 \end{pspicture}
5 \begin{pspicture}(1.5,1)
6   \psRandom[dotsize=5pt,color](0,0)(1.5,0.8){\psellipse(0.75,0.4)
7   (0.75,0.4)}
8 \end{pspicture}

```



```



















1 \psset{unit=3cm}
2 \begin{pspicture}(0,-1)(3,1)
3   \psRandom[dotsize=4pt,dotstyle=o,linecolor=blue,fillcolor=red,%
4   fillstyle=solid,randomPoints=1000] %
5   (0,-1)(3,1){\psplot{0}{3.14}{ x 114 mul sin }}
6 \end{pspicture}

```

8 Arrows

8.1 Definition

`pstricks-add` defines the following "arrows":

Value	Example	Name
-		None
<->		Arrowheads.
>-<		Reverse arrowheads.
<<->>		Double arrowheads.
>>-<<		Double reverse arrowheads.
-		T-bars, flush to endpoints.
* - *		T-bars, centered on endpoints.
[-]		Square brackets.
] - [	Reversed square brackets.
(-)		Rounded brackets.
) - (	Reversed rounded brackets.
o - o		Circles, centered on endpoints.
* - *		Disks, centered on endpoints.
oo - oo		Circles, flush to endpoints.
** - **		Disks, flush to endpoints.
<->		T-bars and arrows.
>-<		T-bars and reverse arrows.
H - H		left/right hook arrows.

You can also mix and match, e.g., `->`, `*->` and `[->` are all valid values of the `arrows` parameter. The parameter can be set with

```
\psset{arrows=<type>}
```

or for some macros with a special option, like

```
\psline[<general options>]{<arrow type>}(A)(B)
```

```
\psline[linecolor=red,linewidth=2pt]{|->}(0,0)(0,2)
```



8.2 Multiple arrows

There are two new options which are only valid for the arrow type `<<` or `>>`. `nArrow` sets both, the `nArrowA` and the `nArrowB` parameter. The meaning is declared in the following tables. Without setting one of these parameters the behaviour is like the one described in the old PSTricks manual.

Value	Meaning
->>	-A
<<->>	A-A
<<-	A-
>>-	B-
-<<	-B
>>-<<	B-B
>>->>	B-A
<<-<<	A-B

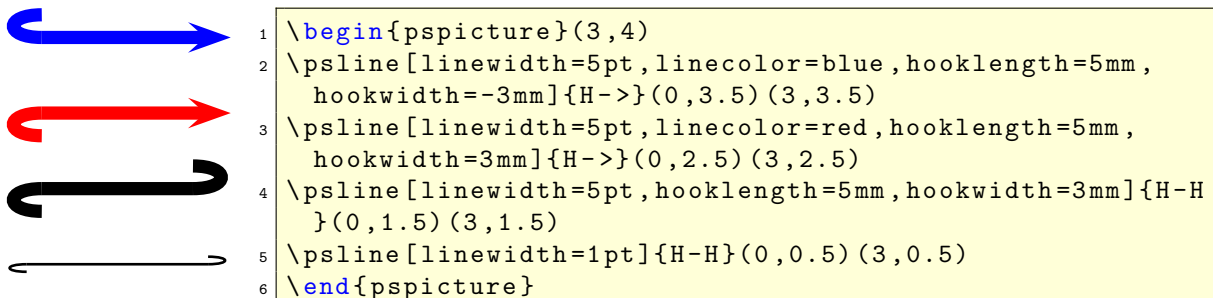
Value	Example
<code>\psline{->>}(0,1ex)(2.3,1ex)</code>	
<code>\psline[nArrowsA=3]{->>}(0,1ex)(2.3,1ex)</code>	
<code>\psline[nArrowsA=5]{->>}(0,1ex)(2.3,1ex)</code>	
<code>\psline{<<-}(0,1ex)(2.3,1ex)</code>	
<code>\psline[nArrowsA=3]{<<-}(0,1ex)(2.3,1ex)</code>	
<code>\psline[nArrowsA=5]{<<-}(0,1ex)(2.3,1ex)</code>	
<code>\psline{<<->>}(0,1ex)(2.3,1ex)</code>	
<code>\psline[nArrowsA=3]{<<->>}(0,1ex)(2.3,1ex)</code>	
<code>\psline[nArrowsA=5]{<<->>}(0,1ex)(2.3,1ex)</code>	
<code>\psline{<<- }(0,1ex)(2.3,1ex)</code>	
<code>\psline[nArrowsA=3]{<<-<<}(0,1ex)(2.3,1ex)</code>	
<code>\psline[nArrowsA=5]{<<-<<}(0,1ex)(2.3,1ex)</code>	
<code>\psline[nArrowsA=3,nArrowsB=4]{<<-<<}(0,1ex)(2.3,1ex)</code>	
<code>\psline[nArrowsA=3,nArrowsB=4]{>>->>}(0,1ex)(2.3,1ex)</code>	
<code>\psline[nArrowsA=1,nArrowsB=4]{>>->>}(0,1ex)(2.3,1ex)</code>	

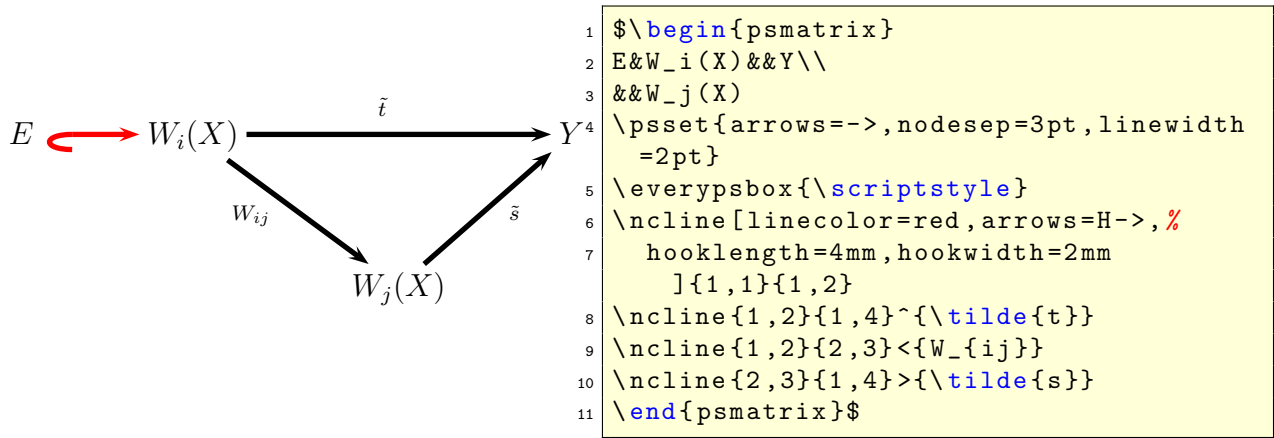
8.3 hookrightarrow and hookleftarrow

This is another type of an arrow and abbreviated with H. The length and width of the hook is set by the new options `hooklength` and `hookwidth`, which are by default set to

```
\psset{hooklength=3mm,hookwidth=1mm}
```

If the line begins with a right hook then the line ends with a left hook and vice versa:






8.4 ArrowInside Option

It is now possible to have arrows inside the lines and not only at the beginning or the end. The new defined options

Name	Example	Output
ArrowInside	<code>\psline[ArrowInside=->](0,0)(2,0)</code>	
ArrowInsidePos	<code>\psline[ArrowInside=->,% ArrowInsidePos=0.25](0,0)(2,0)</code>	
ArrowInsidePos	<code>\psline[ArrowInside=->,% ArrowInsidePos=10](0,0)(2,0)</code>	
ArrowInsideNo	<code>\psline[ArrowInside=->,% ArrowInsideNo=2](0,0)(2,0)</code>	
ArrowInsideOffset	<code>\psline[ArrowInside=->,% ArrowInsideNo=2,% ArrowInsideOffset=0.1](0,0)(2,0)</code>	
ArrowInside	<code>\psline[ArrowInside=->]{->}(0,0)(2,0)</code>	
ArrowInsidePos	<code>\psline[ArrowInside=->,% ArrowInsidePos=0.25]{->}(0,0)(2,0)</code>	
ArrowInsidePos	<code>\psline[ArrowInside=->,% ArrowInsidePos=10]{->}(0,0)(2,0)</code>	
ArrowInsideNo	<code>\psline[ArrowInside=->,% ArrowInsideNo=2]{->}(0,0)(2,0)</code>	
ArrowInsideOffset	<code>\psline[ArrowInside=->,% ArrowInsideNo=2,% ArrowInsideOffset=0.1]{->}(0,0)(2,0)</code>	
ArrowFill	<code>\psline[ArrowFill=false,% arrowinset=0]{->}(0,0)(2,0)</code>	
ArrowFill	<code>\psline[ArrowFill=false,% arrowinset=0]{<<->}(0,0)(2,0)</code>	

Name	Example	Output
ArrowFill	<pre>\psline[ArrowInside=->,% arrowinset=0,% ArrowFill=false,% ArrowInsideNo=2,% ArrowInsideOffset=0.1]{->}(0,0)(2,0)</pre>	

Without the default arrow definition there is only the one inside the line, defined by the type and the position. The position is relative to the length of the whole line. 0.25 means at 25% of the line length. The peak of the arrow gets the coordinates which are calculated by the macro. If you want arrows with an absolute position difference, then choose a value greater than 1, e.g. 10 which places an arrow every 10 pt. The default unit pt cannot be changed.

8.5 ArrowFill Option

By default all arrows are filled polygons. With the option **ArrowFill=false** there are "white" arrows. Only for the beginning/end arrows they are empty, the inside arrows are overpainted with the line.



```
1 \psset{arrowscale=3}
2 \psline[linecolor=red,arrowinset=0]{<->}(0,0)(3,0)
```



```
1 \psset{arrowscale=3}
2 \psline[linecolor=red,arrowinset=0,ArrowFill=false]
  {<->}(0,0)(3,0)
```



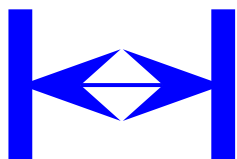
```
1 \psset{arrowscale=3}
2 \psline[linecolor=red,arrowinset=0,arrowsize=0.2,
  ArrowFill=false]{<->}(0,0)(3,0)
```



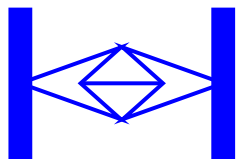
```
1 \psset{arrowscale=3}
2 \psline[linecolor=blue,arrowscale=6,ArrowFill=true]
  {>>->>}(0,0)(3,0)
```



```
1 \psset{arrowscale=3}
2 \psline[linecolor=blue,arrowscale=6,ArrowFill=false]
  {>>->>}(0,0)(3,0)
3 \rule{3cm}{0pt}\\[30pt]
```



```
1 \psset{arrowscale=3}
2 \psline[linecolor=blue,arrowscale=6,ArrowFill=true]
  {>|->|}(0,0)(3,0)
```

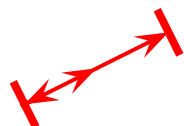


```
1 \psset{arrowscale=3}
2 \psline[linecolor=blue,arrowscale=6,ArrowFill=false]
  {>|->|}(0,0)(3,0) %
```

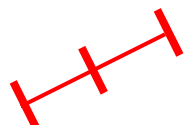
8.6 Examples

All examples are printed with `\psset{arrowscale=2,linecolor=red}`.

8.6.1 `\psline`



```
1 \begin{pspicture}(2,2)
2 \psset{arrowscale=2,ArrowFill=true}
3 \psline[ArrowInside=->]{|<->|}(2,1)
4 \end{pspicture}
```



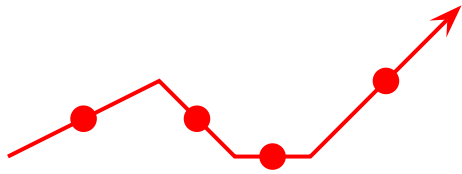
```
1 \begin{pspicture}(2,2)
2 \psset{arrowscale=2,ArrowFill=true}
3 \psline[ArrowInside=-|]{|-|}(2,1)
4 \end{pspicture}
```



```
1 \begin{pspicture}(2,2)
2 \psset{arrowscale=2,ArrowFill=true}
3 \psline[ArrowInside=->,ArrowInsideNo=2]{->}(2,1)
4 \end{pspicture}
```



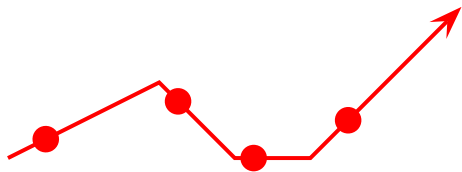
```
1 \begin{pspicture}(2,2)
2 \psset{arrowscale=2,ArrowFill=true}
3 \psline[ArrowInside=->,ArrowInsideNo=2,ArrowInsideOffset=0.1]{->}(2,1)
4 \end{pspicture}
```



```

1 \begin{pspicture}(6,2)
2 \psset{arrowscale=2,ArrowFill=true}
3 \psline[ArrowInside=-*]{->}(0,0)(2,1)(3,0)
4   (4,0)(6,2)
5 \end{pspicture}

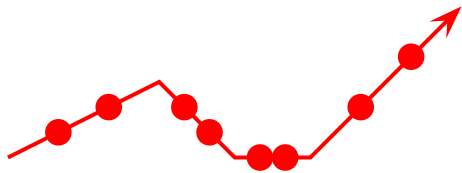
```



```

1 \begin{pspicture}(6,2)
2 \psset{arrowscale=2,ArrowFill=true}
3 \psline[ArrowInside=-*,ArrowInsidePos
4   =0.25]{->}(0,0)(2,1)(3,0)(4,0)(6,2)
5 \end{pspicture}

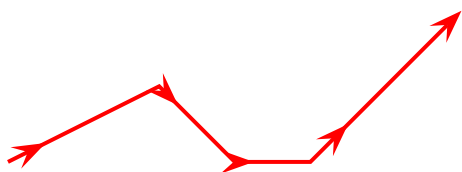
```



```

1 \begin{pspicture}(6,2)
2 \psset{arrowscale=2,ArrowFill=true}
3 \psline[ArrowInside=-*,ArrowInsidePos
4   =0.25,ArrowInsideNo=2]{->}%
5   (0,0)(2,1)(3,0)(4,0)(6,2)
6 \end{pspicture}

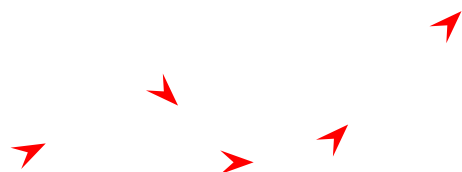
```



```

1 \begin{pspicture}(6,2)
2 \psset{arrowscale=2,ArrowFill=true}
3 \psline[ArrowInside=->,ArrowInsidePos
4   =0.25]{->}%
5   (0,0)(2,1)(3,0)(4,0)(6,2)
6 \end{pspicture}

```



```

1 \begin{pspicture}(6,2)
2 \psset{arrowscale=2,ArrowFill=true}
3 \psline[linestyle=None,ArrowInside=->,
4   ArrowInsidePos=0.25]{->}%
5   (0,0)(2,1)(3,0)(4,0)(6,2)
6 \end{pspicture}

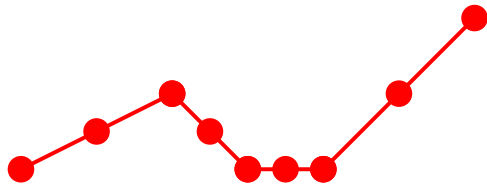
```



```

1 \begin{pspicture}(6,2)
2 \psset{arrowscale=2,ArrowFill=true}
3 \psline[ArrowInside=-<,ArrowInsidePos
4   =0.75]{->}%
5   (0,0)(2,1)(3,0)(4,0)(6,2)
6 \end{pspicture}

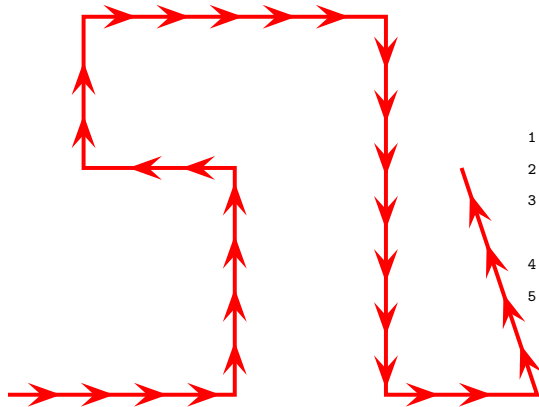
```

```

1 \begin{pspicture}(6,2)
2 \psset{arrowscale=2,ArrowFill=true,
   ArrowInside=-*}
3 \psline(0,0)(2,1)(3,0)(4,0)(6,2)
4 \psset{linestyle=none}
5 \psline[ArrowInsidePos=0](0,0)(2,1)(3,0)
   (4,0)(6,2)
6 \psline[ArrowInsidePos=1](0,0)(2,1)(3,0)
   (4,0)(6,2)
7 \end{pspicture}

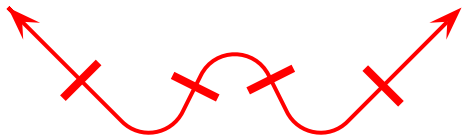
```



```

1 \begin{pspicture}(6,5)
2 \psset{arrowscale=2,ArrowFill=true}
3 \psline[ArrowInside=->,ArrowInsidePos
   =20](0,0)(3,0)%
4       (3,3)(1,3)(1,5)(5,5)(5,0)(7,0)(6,3)
5 \end{pspicture}

```

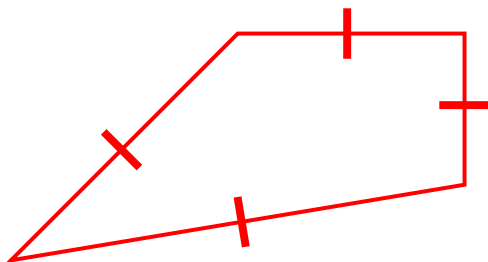


```

1 \begin{pspicture}(6,2)
2 \psset{arrowscale=2,ArrowFill=true}
3 \psline[lineararc=0.5,ArrowInside
   =-|]{<->}(0,2)(2,0)(3,2)(4,0)(6,2)
4 \end{pspicture}

```

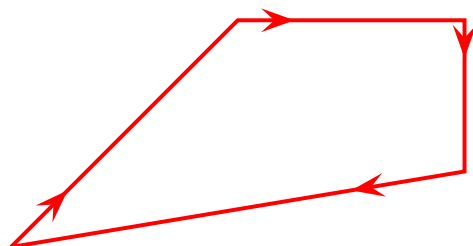
8.6.2 \pspolygon



```

1 \begin{pspicture}(6,3)
2 \psset{arrowscale=2}
3 \pspolygon[ArrowInside=-|](0,0)(3,3)(6,3)
   (6,1)
4 \end{pspicture}

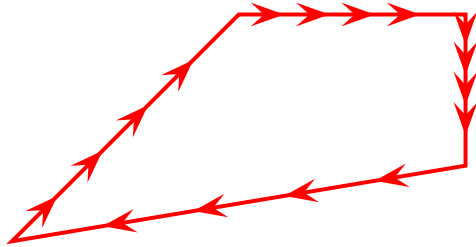
```



```

1 \begin{pspicture}(6,3)
2 \psset{arrowscale=2}
3 \pspolygon[ArrowInside=->,ArrowInsidePos
   =0.25](0,0)(3,3)(6,3)(6,1)
4 \end{pspicture}

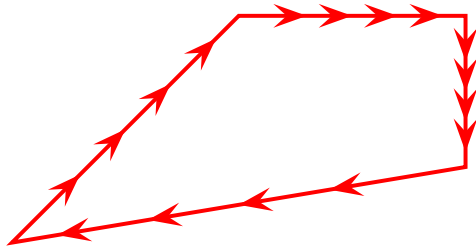
```



```

1 \begin{pspicture}(6,3)
2 \psset{arrowscale=2}
3 \pspolygon[ArrowInside=->,ArrowInsideNo=4]
4 % (0,0)(3,3)(6,3)(6,1)
5 \end{pspicture}

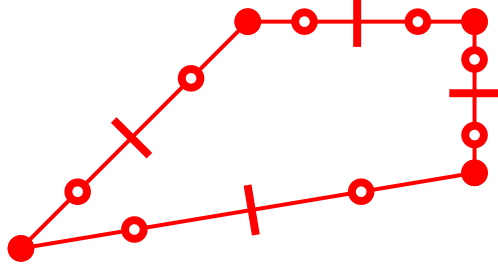
```



```

1 \begin{pspicture}(6,3)
2 \psset{arrowscale=2}
3 \pspolygon[ArrowInside=->,ArrowInsideNo=4,
4 % ArrowInsideOffset=0.1](0,0)(3,3)(6,3)
5 (6,1)
6 \end{pspicture}

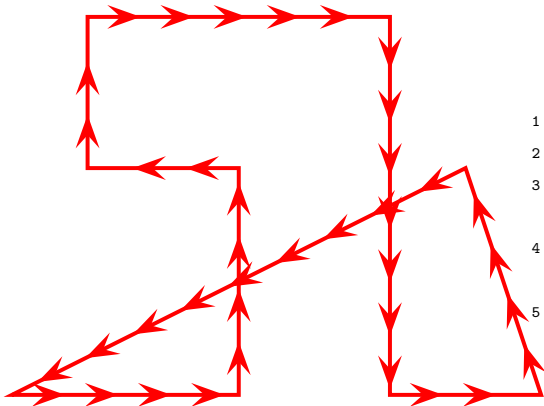
```



```

1 \begin{pspicture}(6,3)
2 \psset{arrowscale=2}
3 \pspolygon[ArrowInside=-|](0,0)(3,3)(6,3)
4 (6,1)
5 \psset{linestyle=none,ArrowInside=-*}
6 \pspolygon[ArrowInsidePos=0](0,0)(3,3)
7 (6,3)(6,1)
8 \pspolygon[ArrowInsidePos=1](0,0)(3,3)
9 (6,3)(6,1)
10 \psset{ArrowInside=-o}
11 \pspolygon[ArrowInsidePos=0.25](0,0)(3,3)
12 (6,3)(6,1)
13 \pspolygon[ArrowInsidePos=0.75](0,0)(3,3)
14 (6,3)(6,1)
15 \end{pspicture}

```

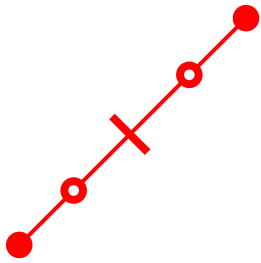


```

1 \begin{pspicture}(6,5)
2 \psset{arrowscale=2}
3 \pspolygon[ArrowInside=->,
4 ArrowInsidePos=20] % (0,0)(3,0)(3,3)(1,3)(1,5)(5,5)(5,0)
5 (7,0)(6,3)
6 \end{pspicture}

```

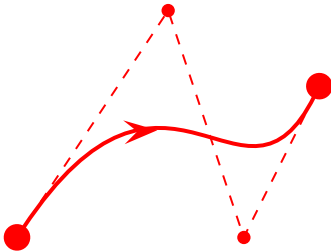
8.6.3 \psbezier



```

1 \begin{pspicture}(3,3)
2 \psset{arrowscale=2}
3   \psbezier[ArrowInside=-|](1,1)(2,2)(3,3)
4   \psset{linestyle=none,ArrowInside=-o}
5   \psbezier[ArrowInsidePos=0.25](1,1)(2,2)(3,3)
6   \psbezier[ArrowInsidePos=0.75](1,1)(2,2)(3,3)
7   \psset{linestyle=none,ArrowInside=-*}
8   \psbezier[ArrowInsidePos=0](1,1)(2,2)(3,3)
9   \psbezier[ArrowInsidePos=1](1,1)(2,2)(3,3)
10 \end{pspicture}

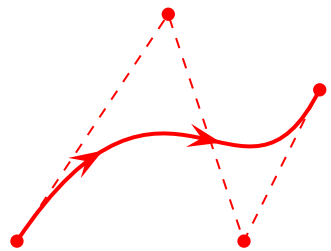
```



```

1 \begin{pspicture}(4,3)
2 \psset{arrowscale=2}
3   \psbezier[ArrowInside=->,showpoints=true]%
4     {*-}(2,3)(3,0)(4,2)
5 \end{pspicture}

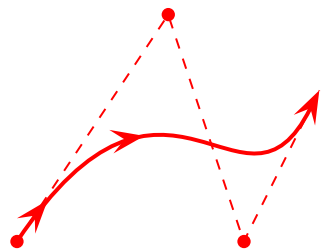
```



```

1 \begin{pspicture}(4,3)
2 \psset{arrowscale=2}
3   \psbezier[ArrowInside=->,showpoints=true,%
4     ArrowInsideNo=2](2,3)(3,0)(4,2)
5 \end{pspicture}

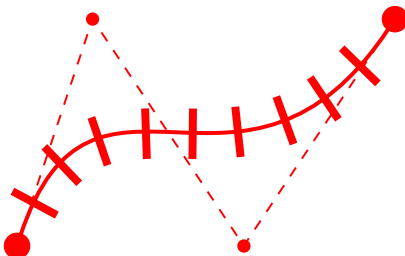
```



```

1 \begin{pspicture}(4,3)
2 \psset{arrowscale=2}
3   \psbezier[ArrowInside=->,showpoints=true,%
4     ArrowInsideNo=2,ArrowInsideOffset
5     =-0.2]{->}(2,3)(3,0)(4,2)
6 \end{pspicture}

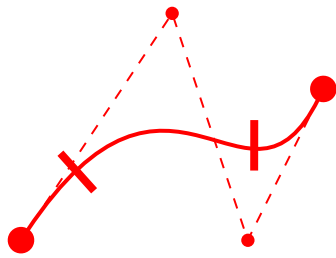
```



```

1 \begin{pspicture}(5,3)
2 \psset{arrowscale=2}
3   \psbezier[ArrowInsideNo=9,ArrowInside=-|,%
4     showpoints=true]{*-}(1,3)(3,0)(5,3)
5 \end{pspicture}

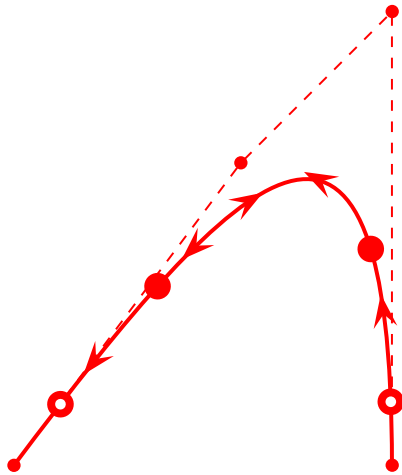
```



```

1 \begin{pspicture}(4,3)
2 \psset{arrowscale=2}
3 \psset{ArrowInside=-|}
4 \psbezier[ArrowInsidePos=0.25,showpoints=true]
5   [*-*](2,3)(3,0)(4,2)
6 \psset{linestyle=none}
7 \psbezier[ArrowInsidePos=0.75](2,3)(3,0)(4,2)
8 \end{pspicture}

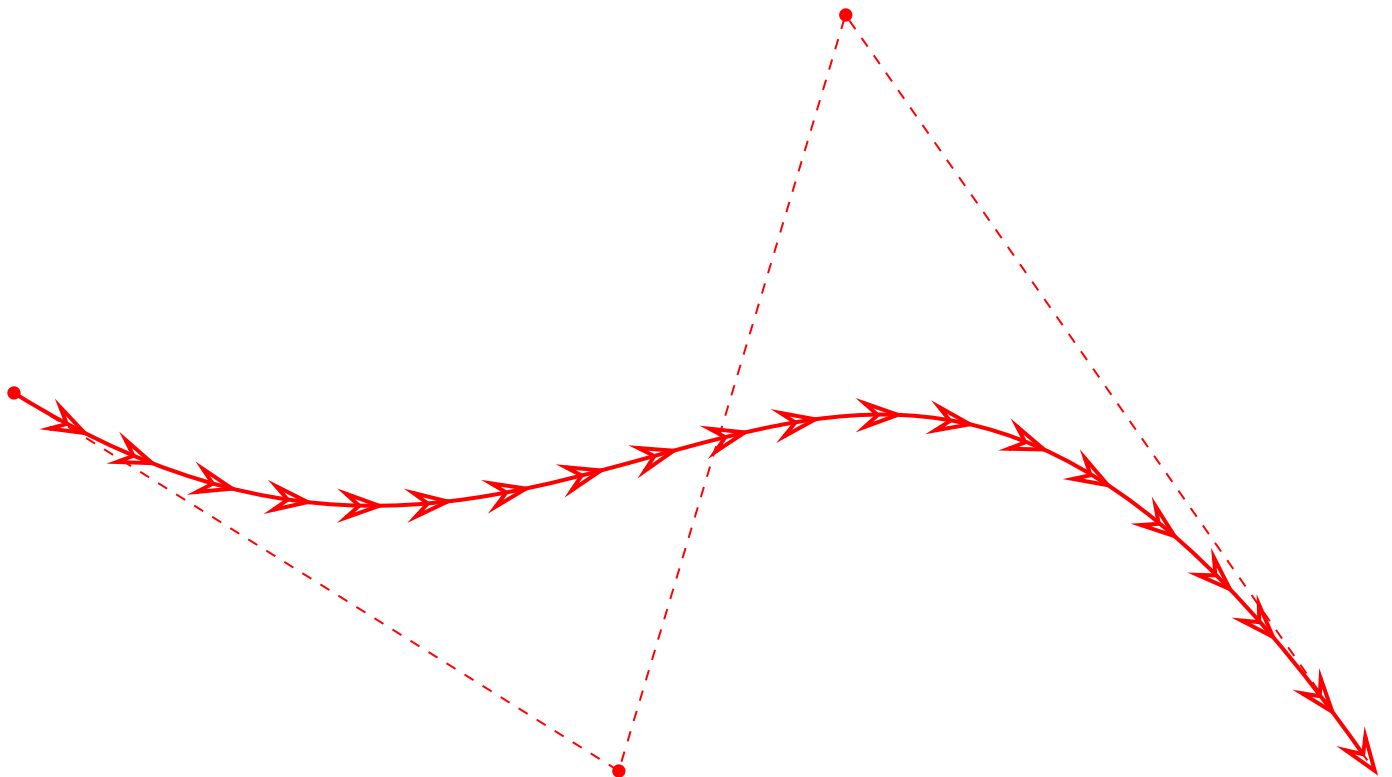
```



```

1 \begin{pspicture}(5,6)
2 \psset{arrowscale=2}
3 \pnode(3,4){A}\pnode(5,6){B}\pnode(5,0){C}
4 \psbezier[ArrowInside=->,%,
5   showpoints=true](A)(B)(C)
6 \psset{linestyle=none,ArrowInside=-<}
7 \psbezier[ArrowInsideNo=4](A)(B)(C)
8 \psset{ArrowInside=-o}
9 \psbezier[ArrowInsidePos=0.1](A)(B)(C)
10 \psbezier[ArrowInsidePos=0.9](A)(B)(C)
11 \psset{ArrowInside=-*}
12 \psbezier[ArrowInsidePos=0.3](A)(B)(C)
13 \psbezier[ArrowInsidePos=0.7](A)(B)(C)
14 \end{pspicture}

```



```

1 \begin{pspicture}(-3,-5)(15,5)
2   \psbezier[ArrowInsideNo=19,%
3     ArrowInside=->,ArrowFill=false,%
4     showpoints=true]{->}(-3,0)(5,-5)(8,5)(15,-5)
5 \end{pspicture}

```

8.6.4 \pcline

These examples need the package `pst-node`.



```

1 \begin{pspicture}(2,1)
2 \psset{arrowscale=2}
3 \pcline[ArrowInside=->](0,0)(2,1)
4 \end{pspicture}

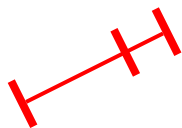
```



```

1 \begin{pspicture}(2,1)
2 \psset{arrowscale=2}
3 \pcline[ArrowInside=->]{<->}(0,0)(2,1)
4 \end{pspicture}

```



```

1 \begin{pspicture}(2,1)
2 \psset{arrowscale=2}
3 \pcline[ArrowInside=-|,ArrowInsidePos=0.75]{|-|}(0,0)(2,1)
4 \end{pspicture}

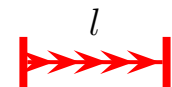
```



```

1 \psset{arrowscale=2}
2 \pcline[ArrowInside=->,ArrowInsidePos=0.65]{*-}(0,0)(2,0)
3 \naput[labelsep=0.3]{\large $g$}

```



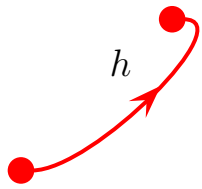
```

1 \psset{arrowscale=2}
2 \pcline[ArrowInside=->,ArrowInsidePos=10]{|-|}(0,0)(2,0)
3 \naput[labelsep=0.3]{\large $l$}

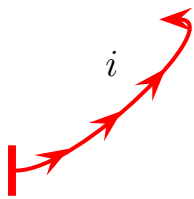
```

8.6.5 \pccurve

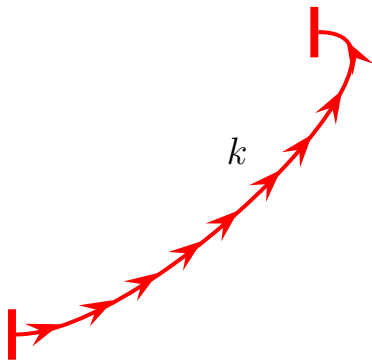
These examples also need the package `pst-node`.



```
1 \begin{pspicture}(2,2)
2 \psset{arrowscale=2}
3 \pccurve[ArrowInside=->,ArrowInsidePos=0.65,showpoints=true]
  [*-*](0,0)(2,2)
4 \naput[labelsep=0.3]{\large$h$}
5 \end{pspicture}
```



```
1 \begin{pspicture}(2,2)
2 \psset{arrowscale=2}
3 \pccurve[ArrowInside=->,ArrowInsideNo=3,showpoints=true]
  [|->](0,0)(2,2)
4 \naput[labelsep=0.3]{\large$i$}
5 \end{pspicture}
```



```
1 \begin{pspicture}(4,4)
2 \psset{arrowscale=2}
3 \pccurve[ArrowInside=->,ArrowInsidePos=20]{|-|}(0,0)(4,4)
4 \naput[labelsep=0.3]{\large$k$}
5 \end{pspicture}
```

9 \psFormatInt

There exist some packages and a lot of code to format an integer like 1 000 000 or 1,234,567 (in Europe 1.234.567). But all packages expect a real number as argument and cannot handle macros as an argument. For this case `pstricks-add` has a macro `psFormatInt` which can handle both:

```
1,234,567 1 \psFormatInt{1234567}\\
1,234,567 2 \psFormatInt[intSeparator={,}]{1234567}\\
1.234.567 3 \psFormatInt[intSeparator=.]{1234567}\\
1-234.567 4 \psFormatInt[intSeparator=$\cdot$]{1234567}\\
965,432 5 \def\temp{965432}
6 \psFormatInt{\temp}
```

With the option `intSeparator` the symbol can be changed to any non-number character.

Part II

pst-node

10 \nclineII

The dashed lines are black and white by default. The new macro `\nclineII` offers two-color lines and has the same syntax as `\ncline`:

`\ncline[<options>]{<Node A>}{<Node B>}`



```
1 \circclenode[linecolor=blue,linewidth=2pt]{A}{A}%  
2 \hspace{9cm}\circclenode[linecolor=cyan,linewidth=2pt]{B}{B}  
3 \nclineII[linewidth=5pt]{A}{B}
```

10.1 The options

These options are all defined in the package `pstricks-add`.

name	meaning
<code>dashColorI</code>	first color, default is black
<code>dashColorII</code>	second color, default is red
<code>dashNo</code>	The ratio of <code>dashColorI</code> to <code>dashColorII</code> , the default is 0.2

`dashNo` can have values greater than 1. In this case the value will be taken as an absolute width in the pt unit. Only this unit is possible!

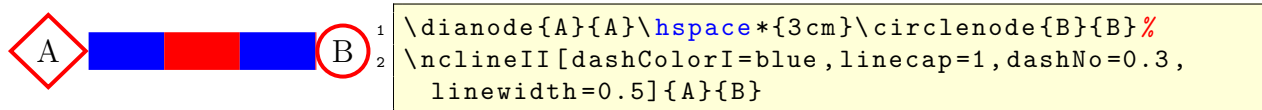
10.2 Examples



```
1 \circclenode{A}{A}\hspace*{3cm}\diamondnode{B}{B}%  
2 \nclineII[linewidth=8pt,dashColorI=blue]{A}{B}
```



```
1 \circclenode{A}{A}\hspace*{3cm}\circclenode{B}{B}%  
2 \nclineII[dashColorI=blue,linewidth=3pt,dashNo  
=15]{->}{A}{B}
```



11 \pclineII

This is nearly the same macro as `\psline` from the main `psstricks` package.

`\pcline[<options>](<Node A>)(<Node B>)`



```

1 \circlednode[linecolor=blue, linewidth=2pt]{A}{A}%
2 \hspace*{9cm}\circlednode[linecolor=cyan, linewidth=2pt]{B}{B}
3 \pclineII[linewidth=5pt](A)(B)

```

This macro makes only sense when connecting two "invisible" nodes, like this connection from here to the above word `psstricks`.

```

1 \raggedright This macro makes only sense when connecting two ''invisible
   '' nodes,
2 like this connection from here\pnode{D}\pclineII{->}(D)(C){}
3 to the above word \verb|psstricks|.

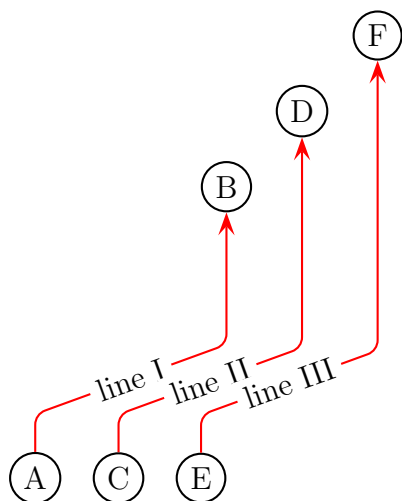
```

12 \ncdiag and \pcdiag

With the new option `lineAngle` the lines drawn by the `ncdiag` macro can now have a specified gradient. Without this option one has to define the two arms (which maybe zero) and PSTricks draws the connection between them. Now there is only a static `armA`, the second one `armB` is calculated when an angle `lineAngle` is defined. This angle is the gradient of the intermediate line between the two arms. The syntax of `ncdiag` is

`\ncdiag[<options>]{<Node A>}{<Node B>}`
`\pcdiag[<options>](<Node A>)(<Node B>)`

name	meaning
<code>lineAngle</code>	angle of the intermediate line segment. Default is 0, which is the same than using <code>ncdiag</code> without the <code>lineAngle</code> option.

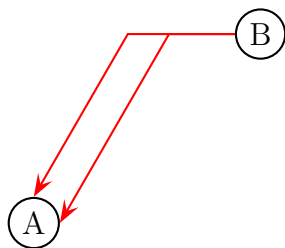


```

1 \begin{pspicture}(5,6)
2   \circnode{A}{A}\quad\circnode{C}{C}%
3   \quad\circnode{E}{E}
4   \rput(0,4){\circnode{B}{B}}
5   \rput(1,5){\circnode{D}{D}}
6   \rput(2,6){\circnode{F}{F}}
7   \psset{arrowscale=2,lineararc=0.2,%
8     linecolor=red,armA=0.5, angleA=90,angleB
9     =-90}
10  \ncdiag[lineAngle=20]{->}{A}{B}
11  \ncput*[nrot=:U]{line I}
12  \ncdiag[lineAngle=20]{->}{C}{D}
13  \ncput*[nrot=:U]{line II}
14  \ncdiag[lineAngle=20]{->}{E}{F}
15  \ncput*[nrot=:U]{line III}
16 \end{pspicture}

```

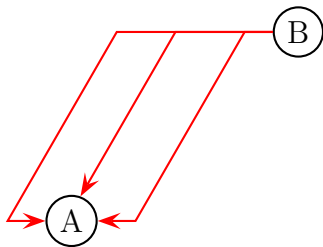
The `ncdiag` macro sets the `armB` dynamically to the calculated value. Any user setting of `armB` is overwritten by the macro. The `armA` could be set to a zero length:



```

1 \begin{pspicture}(4,3)
2   \rput(0.5,0.5){\circnode{A}{A}}
3   \rput(3.5,3){\circnode{B}{B}}
4   {\psset{linecolor=red,arrows=<-,arrowscale=2}
5     \ncdiag[lineAngle=60,%
6       armA=0,angleA=0,angleB=180]{A}{B}
7     \ncdiag[lineAngle=60,%
8       armA=0,angleA=90,angleB=180]{A}{B}}
9 \end{pspicture}

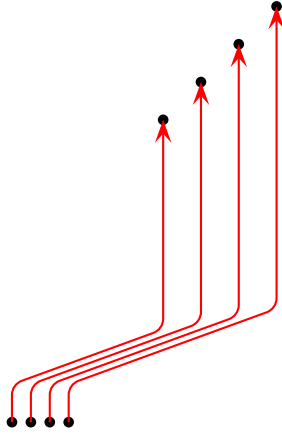
```



```

1 \begin{pspicture}(4,3)
2   \rput(1,0.5){\circnode{A}{A}}
3   \rput(4,3){\circnode{B}{B}}
4   {\psset{linecolor=red,arrows=<-,arrowscale=2}
5     \ncdiag[lineAngle=60,%
6       armA=0.5,angleA=0,angleB=180]{A}{B}
7     \ncdiag[lineAngle=60,%
8       armA=0,angleA=70,angleB=180]{A}{B}
9     \ncdiag[lineAngle=60,%
10      armA=0.5,angleA=180,angleB=180]{A}{B}}
11 \end{pspicture}

```



```

1 \begin{pspicture}(4,5.5)
2   \cnode*(0,0){2pt}{A}%
3   \cnode*(0.25,0){2pt}{C}%
4   \cnode*(0.5,0){2pt}{E}%
5   \cnode*(0.75,0){2pt}{G}%
6   \cnode*(2,4){2pt}{B}%
7   \cnode*(2.5,4.5){2pt}{D}%
8   \cnode*(3,5){2pt}{F}%
9   \cnode*(3.5,5.5){2pt}{H}%
10  {\psset{arrowscale=2,lineararc=0.2,%
11    linecolor=red,armA=0.5, angleA=90,angleB=-90}
12  \pcdiag[lineAngle=20]{->}{A}(B)
13  \pcdiag[lineAngle=20]{->}{C}(D)
14  \pcdiag[lineAngle=20]{->}{E}(F)
15  \pcdiag[lineAngle=20]{->}{G}(H)}
16 \end{pspicture}

```

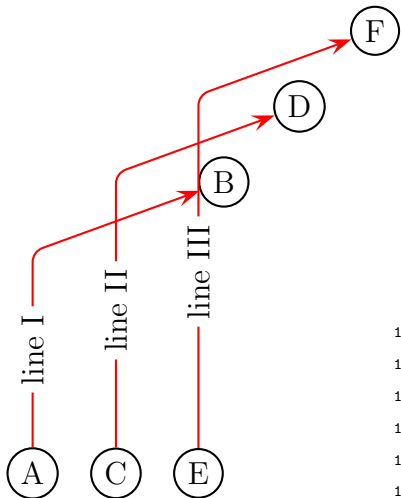
13 \ncdiag and \pcdiag

This is nearly the same than `\ncdiag` except that `armB=0` and the `angleB` value is computed by the macro, so that the line ends at the node with an angle like a `\pcdiag` line. The syntax of `ncdiag`/`pcdiag` is

```

\ncdiag[<options>]{<Node A>}{<Node B>}
\pcdiag[<options>](<Node A>)(<Node B>)

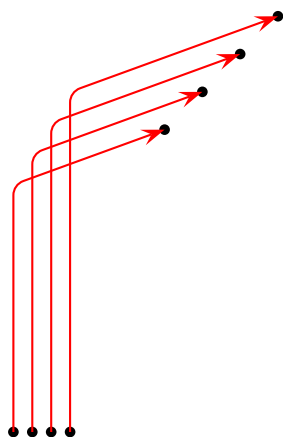
```



```

1 \begin{pspicture}(4,6)
2   \psset{linecolor=black}
3   \circlenode{A}{A}%
4   \quad\circlenode{C}{C}%
5   \quad\circlenode{E}{E}
6   \rput(0,4){\circlenode{B}{B}}
7   \rput(1,5){\circlenode{D}{D}}
8   \rput(2,6){\circlenode{F}{F}}
9   {\psset{arrowscale=2,lineararc=0.2,linecolor=red
10     ,armA=0.5, angleA=90}
11  \ncdiag[lineAngle=-160]{->}{A}{B}
12  \ncput*[nrot=:U]{line I}
13  \ncdiag[lineAngle=-160]{->}{C}{D}
14  \ncput*[nrot=:U]{line II}
15  \ncdiag[lineAngle=-160]{->}{E}{F}
16  \ncput*[nrot=:U]{line III}}
17 \end{pspicture}

```

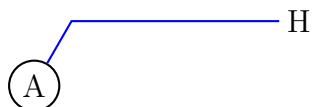


```

1 \begin{pspicture}(4,6)
2   \psset{linecolor=black}
3   \cnode*(0,0){2pt}{A}%
4   \cnode*(0.25,0){2pt}{C}%
5   \cnode*(0.5,0){2pt}{E}%
6   \cnode*(0.75,0){2pt}{G}%
7   \cnode*(2,4){2pt}{B}%
8   \cnode*(2.5,4.5){2pt}{D}%
9   \cnode*(3,5){2pt}{F}%
10  \cnode*(3.5,5.5){2pt}{H}%
11  {\psset{arrowscale=2,lineararc=0.2,linecolor=red
12    ,armA=0.5, angleA=90}
13  \pcdiagg[lineAngle=20]{->}(A)(B)
14  \pcdiagg[lineAngle=20]{->}(C)(D)
15  \pcdiagg[lineAngle=20]{->}(E)(F)
16  \pcdiagg[lineAngle=20]{->}(G)(H)}
17 \end{pspicture}

```

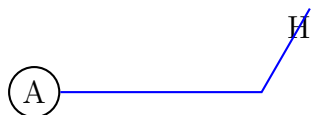
The only catch for `\ncdiagg` is, that you need the right value for `lineAngle`. If the node connection is on the wrong side of the second node, then choose the corresponding angle, e.g.: if 20 is wrong then take -160 , the corresponding to 180.



```

1 \begin{pspicture}(4,1.5)
2   \circlenode{a}{A}
3   \rput[l](3,1){\rnode{b}{H}}
4   \ncdiagg[lineAngle=60,angleA=180,armA=.5,nodesepA=3
5     pt,linecolor=blue]{b}{a}
6 \end{pspicture}

```



```

1 \begin{pspicture}(4,1.5)
2   \circlenode{a}{A}
3   \rput[l](3,1){\rnode{b}{H}}
4   \ncdiagg[lineAngle=60,armA=.5,nodesepB=3pt,
5     linecolor=blue]{a}{b}
6 \end{pspicture}

```



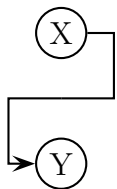
```

1 \begin{pspicture}(4,1.5)
2   \circlenode{a}{A}
3   \rput[l](3,1){\rnode{b}{H}}
4   \ncdiagg[lineAngle=-120,armA=.5,nodesepB=3pt,
5     linecolor=blue]{a}{b}
6 \end{pspicture}

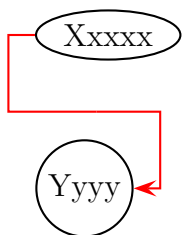
```

14 \ncbarr

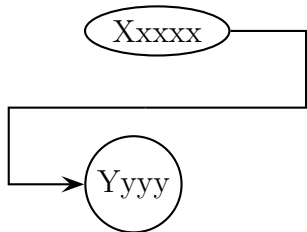
This has the same behaviour as `ncbar`, but has 5 segments and all are horizontal ones. This is the reason why `angleA` must be 0 or alternative 180. All other values are set to 0 by the macro. The intermediate horizontal line is symmetrical to the distance of the two nodes.



```
1 \psset{arrowscale=2}%
2 \circlenode{X}{X}\[1cm]
3 \circlenode{Y}{Y}
4 \ncbarr[angleA=0,arrows=->,arrowscale=2]{X}{Y}
```



```
1 \psset{arrowscale=2}%
2 \ovalnode{X}{Xxxxx}\[1cm]
3 \circlenode{Y}{Yyyy}
4 \ncbarr[angleA=180,arrows=->,arrowscale=2,linecolor=red]{X}{Y}
```



```
1 \psset{arrowscale=2}%
2 \ovalnode{X}{Xxxxx}\[1cm]
3 \circlenode{Y}{Yyyy}
4 \ncbarr[angleA=20,arm=1cm,arrows=->,arrowscale=2]{X}{Y}
```

15 \psRelLine

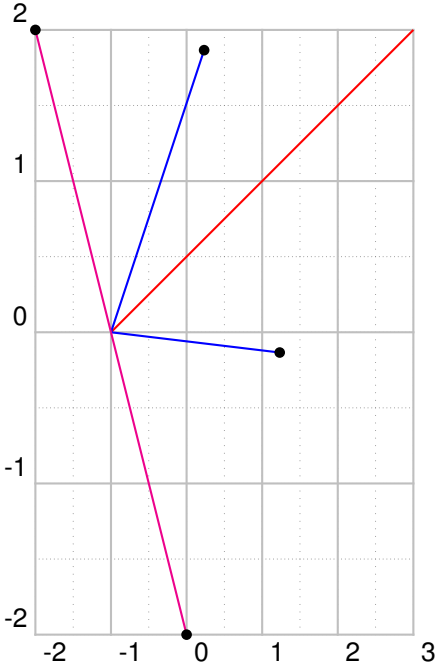
With this macro it is possible to plot lines relative to a given one. Parameter are the angle and the length factor:

```
\psRelLine(<P0>)(<P1>){<length factor>}{<end node name>}
\psRelLine{<arrows>}(P0)(P1){<length factor>}{<end node name>}
\psRelLine[<options>](P0)(P1){<length factor>}{<end node name>}
\psRelLine[<options>]{<arrows>}(P0)(P1){<length factor>}{<end node name>}
```

The length factor depends to the distance of $\overline{P_0P_1}$ and the end node name must be a valid nodename and shouldn't contain any of the special PostScript characters. There are two valid options:

name	default	meaning
angle	0	angle between the given line P_0P_1 and the new one $P_0P_{endNode}$
trueAngle	false	defines whether the angle depends to the seen line or to the mathematical one, which respect the scaling factors xunit and yunit .

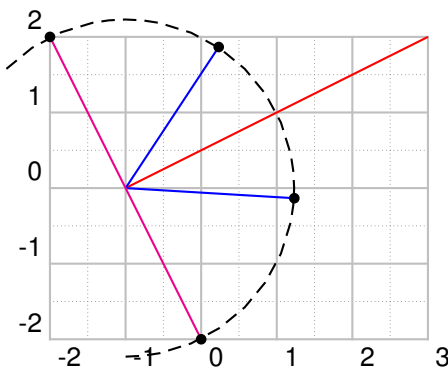
The following two figures show the same, the first one with a scaling different to 1 : 1, this is the reason why the end points are on an ellipse and not on a circle like in the second figure.



```

1 \psset{yunit=2,xunit=1}
2 \begin{pspicture}(-2,-2)(3,2)
3 \psgrid[subgriddiv=2,subgriddots=10,gridcolor=
  lightgray]
4 \pnode(-1,0){A}\pnode(3,2){B}
5 \psline[linecolor=red](A)(B)
6 \psRelLine[linecolor=blue,angle=30](-1,0)(B)
  {0.5}{EndNode}
7 \qdisk(EndNode){2pt}
8 \psRelLine[linecolor=blue,angle=-30](A)(B)
  {0.5}{EndNode}
9 \qdisk(EndNode){2pt}
10 \psRelLine[linecolor=magenta,angle=90](-1,0)
  (3,2){0.5}{EndNode}
11 \qdisk(EndNode){2pt}
12 \psRelLine[linecolor=magenta,angle=-90](A)(B)
  {0.5}{EndNode}
13 \qdisk(EndNode){2pt}
14 \end{pspicture}

```

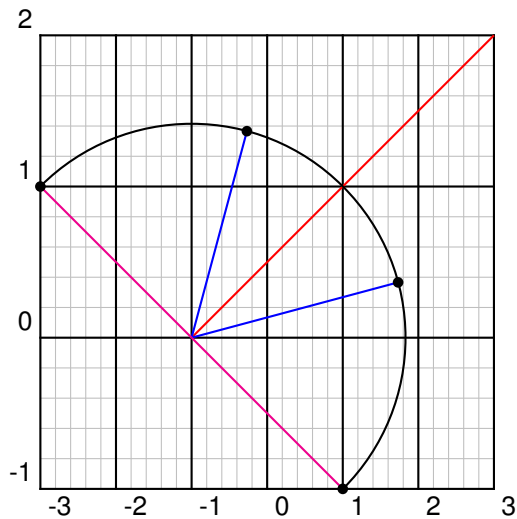


```

1 \begin{pspicture}(-2,-2)(3,2)
2 \psgrid[subgriddiv=2,subgriddots=10,gridcolor=
  lightgray]
3 \pnode(-1,0){A}\pnode(3,2){B}
4 \psline[linecolor=red](A)(B)
5 \psarc[linestyle=dashed](A){2.23}{-90}{135}
6 \psRelLine[linecolor=blue,angle=30](-1,0)(B)
  {0.5}{EndNode}
7 \qdisk(EndNode){2pt}
8 \psRelLine[linecolor=blue,angle=-30](A)(B)
  {0.5}{EndNode}
9 \qdisk(EndNode){2pt}
10 \psRelLine[linecolor=magenta,angle=90](-1,0)
  (3,2){0.5}{EndNode}
11 \qdisk(EndNode){2pt}
12 \psRelLine[linecolor=magenta,angle=-90](A)(B)
  {0.5}{EndNode}
13 \qdisk(EndNode){2pt}
14 \end{pspicture}

```

The following figure has also a different scaling, but has set the option **trueAngle**, all angles depends to what "you see".

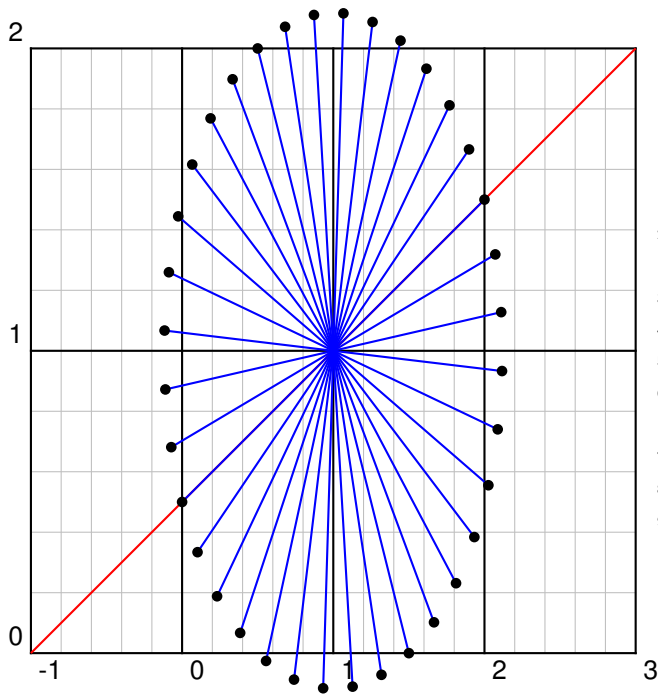


```

1 \psset{yunit=2,xunit=1}
2 \begin{pspicture}(-3,-1)(3,2)\psgrid[
   subgridcolor=lightgray]
3 \pnode(-1,0){A}\pnode(3,2){B}
4 \psline[linecolor=red](A)(B)
5 \psarc(A){2.83}{-45}{135}
6 \psRelLine[linecolor=blue,angle=30,
   trueAngle](A)(B){0.5}{EndNode}
7 \qdisk(EndNode){2pt}
8 \psRelLine[linecolor=blue,angle=-30,
   trueAngle](A)(B){0.5}{EndNode}
9 \qdisk(EndNode){2pt}
10 \psRelLine[linecolor=magenta,angle=90,
   trueAngle](A)(B){0.5}{EndNode}
11 \qdisk(EndNode){2pt}
12 \psRelLine[linecolor=magenta,angle=-90,
   trueAngle](A)(B){0.5}{EndNode}
13 \qdisk(EndNode){2pt}
14 \end{pspicture}

```

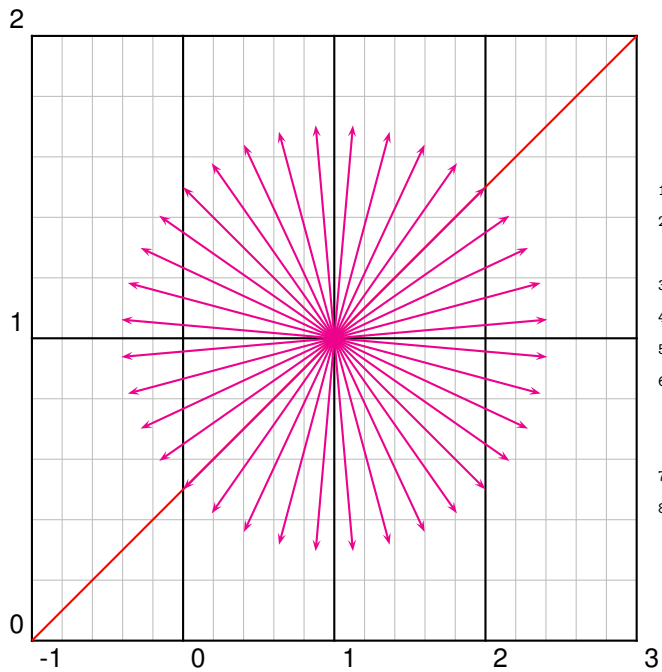
Two examples with using `\multido` to show the behaviour of the options `trueAngle` and `angle`.



```

1 \psset{yunit=4,xunit=2}
2 \begin{pspicture}(-1,0)(3,2)\psgrid
   [subgridcolor=lightgray]
3 \pnode(-1,0){A}\pnode(1,1){B}
4 \psline[linecolor=red](A)(3,2)
5 \multido{\iA=0+10}{36}{%
6   \psRelLine[linecolor=blue,angle=\
   iA](B)(A){-0.5}{EndNode}
7   \qdisk(EndNode){2pt}
8 }
9 \end{pspicture}

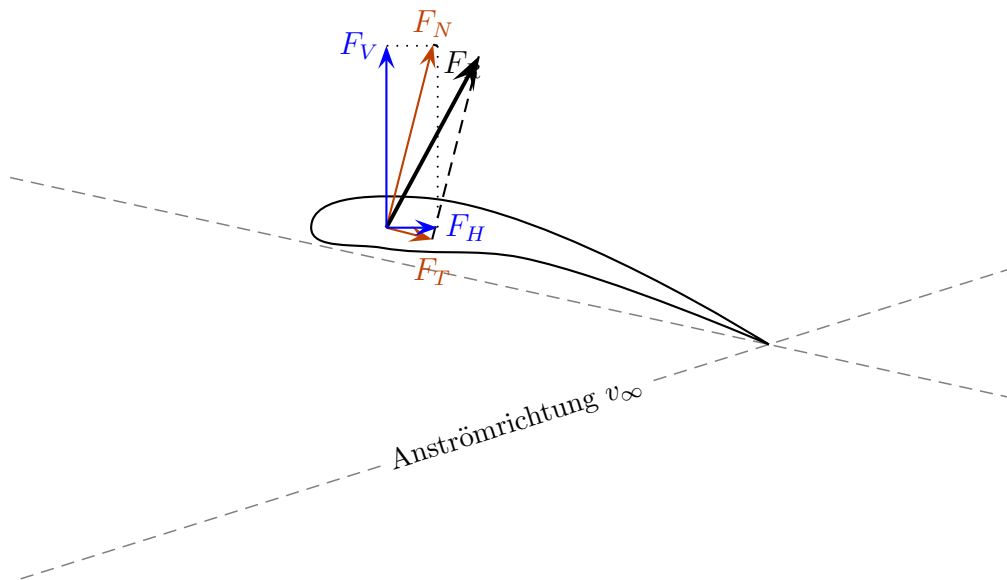
```



```

1 \psset{yunit=4,xunit=2}
2 \begin{pspicture}(-1,0)(3,2)\psgrid
   [subgridcolor=lightgray]
3 \pnode(-1,0){A}\pnode(1,1){B}
4 \psline[linecolor=red](A)(3,2)
5 \multido{\iA=0+10}{36}{%
6   \psRelLine[linecolor=magenta,
7     angle=\iA,trueAngle]{->}{B}(A)
8     {-0.5}{EndNode}
9 }
10 \end{pspicture}

```



```

1 \psset{xunit=0.8\linewidth,yunit=0.8\linewidth,trueAngle}%
2 \begin{pspicture}(1,0.6)\psgrid
3   \pnode(.3,.35){Vk} \pnode(.375,.35){D}
4   \pnode(0,.4){DST1} \pnode(1,.18){DST2}
5   \pnode(0,.1){A1} \pnode(1,.31){A1}
6   { \psset{linewidth=.02,linestyle=dashed,linecolor=gray}%
7     \pcline(DST1)(DST2) % <- Druckseitentangente
8     \pcline(A2)(A1) % <- Anströmrichtung
9     \lput*{:U}{\small Anströmrichtung $v_{\infty}$}}
10  }%
11  \psIntersectionPoint(A1)(A2)(DST1)(DST2){Hk}
12  \pscurve(Hk)(.4,.38)(Vk)(.36,.33)(.5,.32)(Hk)
13  \psParallelLine[linecolor=red!75!green,arrows=->,arrowscale=2](Vk)(Hk)(D
14    ){.1}{FtE}
15  \psRelLine[linecolor=red!75!green,arrows=->,%
16    arrowscale=2,angle=90](D)(FtE){4}{Fn}% why "4"?
17  \psParallelLine[linestyle=dashed](D)(FtE)(Fn){.1}{Fnr1}
18  \psRelLine[linestyle=dashed,angle=90](FtE)(D){-4}{Fnr2} % why "-4"?
19  \psline[linewidth=1.5pt,arrows=->,arrowscale=2](D)(Fnr2)
20  \psIntersectionPoint(D)([nodesep=2]D)(Fnr1)([offset=-4]Fnr1){Fh}
21  \psIntersectionPoint(D)([offset=2]D)(Fnr1)([nodesep=4]Fnr1){Fv}
22  \psline[linecolor=blue,arrows=->,arrowscale=2](D)(Fh)
23  \psline[linecolor=blue,arrows=->,arrowscale=2](D)(Fv)
24  \psline[linestyle=dotted](Fh)(Fnr1)
25  \psline[linestyle=dotted](Fv)(Fnr1)
26  \uput{.1}[0](Fh){\blue $F_{\text{H}}$}
27  \uput{.1}[180](Fv){\blue $F_{\text{V}}$}
28  \uput{.1}[-45](Fnr1){$F_{\text{R}}$}
29  \uput{.1}[90](Fn){\color{red!75!green}$F_{\text{N}}$}
30  \uput{.25}[-90](FtE){\color{red!75!green}$F_{\text{T}}$}
31 \end{pspicture}

```

16 \psParallelLine

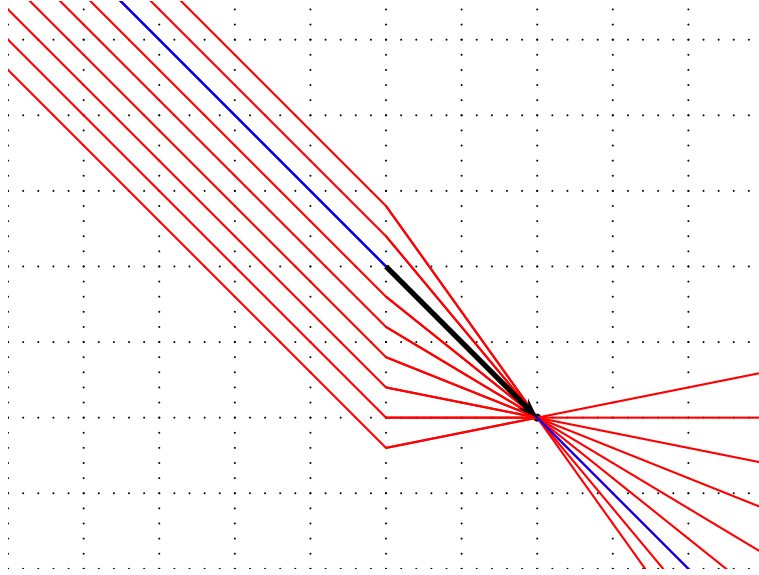
With this macro it is possible to plot lines relative to a given one, which is parallel. There is no special parameter here.

```

\psParallelLine(<P0>)(<P1>)(<P2>){<length>}{<end node name>}
\psParallelLine[<arrows>](<P0>)(<P1>)(<P2>){<length>}{<end node name>}
\psParallelLine[<options>](<P0>)(<P1>)(<P2>){<length>}{<end node name>}
\psParallelLine[<options>]{<arrows>}(<P0>)(<P1>)(<P2>){<length>}{<end node name>}

```

The line starts at P_2 , is parallel to $\overline{P_0P_1}$ and the length of this parallel line depends to the length factor. The end node name must be a valid nodename and shouldn't contain any of the special PostScript characters.



```

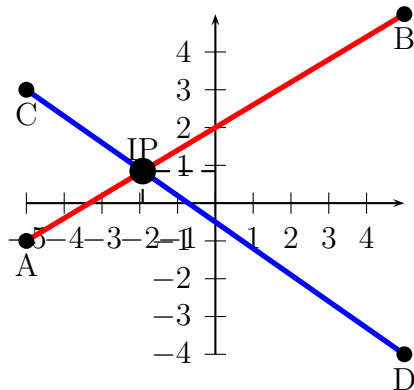
1 \begin{pspicture*}(-5,-4)(5,3.5)
2   \psgrid[subgriddiv=0,griddots=5]
3   \pnode(2,-2){FF}\qdisk(FF){1.5pt}
4   \pnode(-5,5){A}\pnode(0,0){O}
5   \multido{\nCountA=-2.4+0.4}{9}{%
6     \psParallelLine[linecolor=red](O)(A)(0,\nCountA){9}{P1}
7     \psline[linecolor=red](O,\nCountA)(FF)
8     \psRelLine[linecolor=red](O,\nCountA)(FF){9}{P2}
9   }
10  \psline[linecolor=blue](A)(FF)
11  \psRelLine[linecolor=blue](A)(FF){5}{END1}
12  \rput(0,0){%
13    \psline[linewidth=1pt](xLeft)(xRight)
14    \psline[linewidth=2pt,arrows=->](F')(FF)
15  }%
16 \end{pspicture*}

```

17 \psIntersectionPoint

This macro calculates the intersection point of two lines, given by the four coordinates. There is no special parameter here.

`\psIntersectionPoint(<P0>)(<P1>)(<P2>)(<P3>){<node name>}`



```

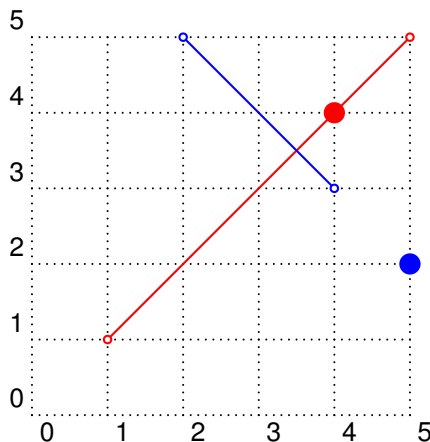
1 \psset{unit=0.5cm}
2 \begin{pspicture}(-5,-4)(5,5)
3   \psaxes{->}(0,0)(-5,-4)(5,5)
4   \psline[linecolor=red,linewidth=2pt](-5,-1)
5     (5,5)
6   \psline[linecolor=blue,linewidth=2pt](-5,3)
7     (5,-4)
8   \qdisk(-5,-1){3pt}\uput[-90](-5,-1){A}
9   \qdisk(5,5){3pt}\uput[-90](5,5){B}
10  \qdisk(-5,3){3pt}\uput[-90](-5,3){C}
11  \qdisk(5,-4){3pt}\uput[-90](5,-4){D}
12  \psIntersectionPoint(-5,-1)(5,5)(-5,3)(5,-4)
13    {IP}
14  \qdisk(IP){5pt}\uput{0.3}[90](IP){IP}
15  \psline[linestyle=dashed](IP|0,0)(IP)(0,0|IP)
16 \end{pspicture}

```

18 \psLNode and \psLCNode

`\psLNode` interpolates the Line \overline{AB} by the given value and sets a node at this point. The syntax is

`\setLNode(P1)(P2){value}{Node name}`



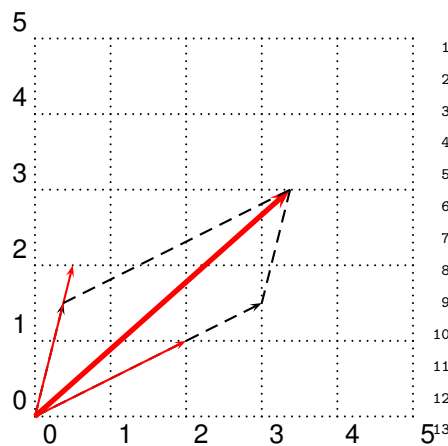
```

1 \begin{pspicture}(5,5)
2   \psgrid[subgriddiv=0,griddots=10]
3   \psset{linecolor=red}
4   \psline{o-o}(1,1)(5,5)
5   \setLNode(1,1)(5,5){0.75}{PI}
6   \qdisk(PI){4pt}
7   \psset{linecolor=blue}
8   \psline{o-o}(4,3)(2,5)
9   \setLNode(4,3)(2,5){-0.5}{PII}
10  \qdisk(PII){4pt}
11 \end{pspicture}

```

The `\psLCNode` macro builds the linear combination of the two given vectors and stores the end of the new vector as a node. All vectors start at (0,0), so a `\rput` maybe appropriate. The syntax is

`\setLCNode(P1){value 1}(P2){value 2}{Node name}`



```

1 \begin{pspicture}(5,5)
2 \psgrid[subgriddiv=0,griddots=10]
3 \psset{linecolor=black}
4 \psline[linestyle=dashed]{->}(3,1.5)
5 \psline[linestyle=dashed]{->}(0.375,1.5)
6 \psset{linecolor=red}
7 \psline{->}(2,1)\psline{->}(0.5,2)
8 \setLCNode(2,1){1.5}(0.5,2){0.75}{PI}
9 \psline[linewidth=2pt]{->}(PI)
10 \psset{linecolor=black}
11 \psline[linestyle=dashed](3,1.5)(PI)
12 \psline[linestyle=dashed](0.375,1.5)(PI)
13 \end{pspicture}

```

Part III

pst-plot

19 New options

The option `tickstyle=full|top|bottom` is already present in the `pst-plot` package, but it is mentioned here for some completeness.

Table 2: All new parameters for `pst-plot`

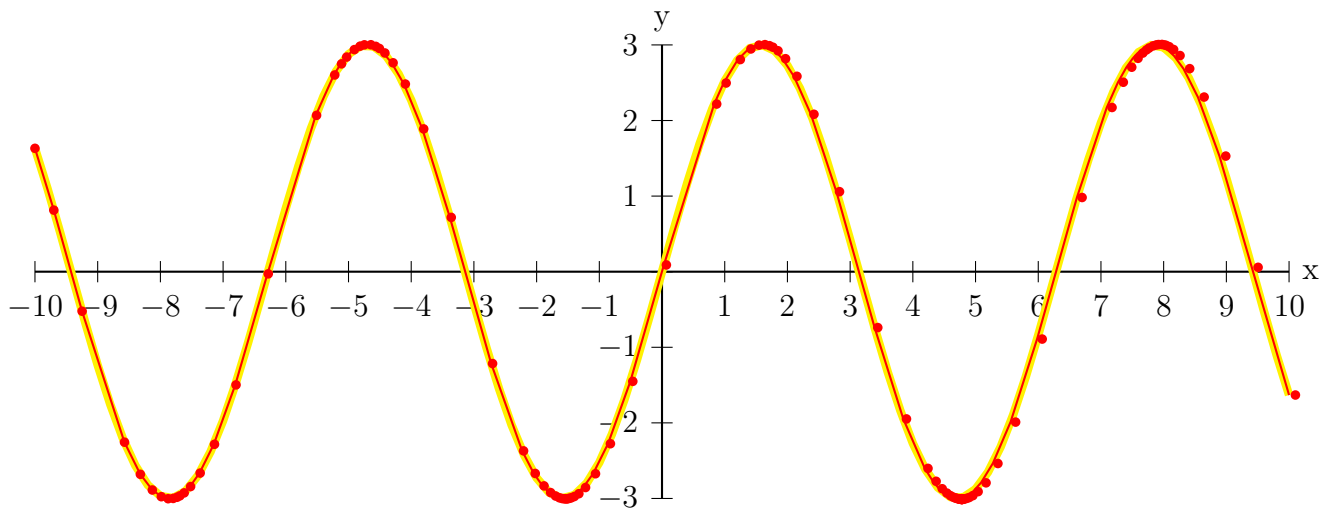
Name	Type	Default
<code>algebraic</code>	<code>false true</code>	<code>false</code>
<code>comma</code>	<code>false true</code>	<code>false</code>
<code>xAxis</code>	<code>false true</code>	<code>true</code>
<code>yAxis</code>	<code>false true</code>	<code>true</code>
<code>xyAxes</code>	<code>false true</code>	<code>true</code>
<code>xDecimals</code>	<code><number> or empty</code>	<code>{}</code>
<code>yDecimals</code>	<code><number> or empty</code>	<code>{}</code>
<code>xyDecimals</code>	<code><number> or empty</code>	<code>{}</code>
<code>xLabel</code>	<code><anything></code>	<code>{}</code>
<code>yLabel</code>	<code><anything></code>	<code>{}</code>
<code>xyLabel</code>	<code><anything></code>	<code>{}</code>
<code>tickstyle</code>	<code>full top bottom</code>	<code>full</code>
<code>ticks</code>	<code><all x y none></code>	<code>all</code>
<code>labels</code>	<code><all x y none></code>	<code>all</code>
<code>subticks</code>	<code><number></code>	<code>0</code>
<code>xsubticks</code>	<code><number></code>	<code>0</code>
<code>ysubticks</code>	<code><number></code>	<code>0</code>
<code>ticksize</code>	<code><length [length]></code>	<code>-4pt 4pt</code>
<code>subticksize</code>	<code><number></code>	<code>0.75</code>
<code>tickwidth</code>	<code><length></code>	<code>0.5\pslinewidth</code>
<code>subtickwidth</code>	<code><length></code>	<code>0.25\pslinewidth</code>
<code>tickcolor</code>	<code><color></code>	<code>black</code>
<code>xtickcolor</code>	<code><color></code>	<code>black</code>
<code>ytickcolor</code>	<code><color></code>	<code>black</code>
<code>subtickcolor</code>	<code><color></code>	<code>darkgray</code>
<code>xsubtickcolor</code>	<code><color></code>	<code>darkgray</code>
<code>ysubtickcolor</code>	<code><color></code>	<code>darkgray</code>
<code>ticklinestyle</code>	<code>solid dashed dotted none</code>	<code>solid</code>
<code>subticklinestyle</code>	<code>solid dashed dotted none</code>	<code>solid</code>
<code>xlabelFactor</code>	<code><anything></code>	<code>{\ empty}</code>
<code>ylabelFactor</code>	<code><anything></code>	<code>{\ empty}</code>
<code>xlogBase</code>	<code><number> or empty</code>	<code>{}</code>

Name	Type	Default
ylogBase	<number> or empty	{}
xylogBase	<number> or empty	{}
logLines	<none x y all>	none
nStep	<number>	1
nStart	<number>	0
nEnd	<number> or empty	{}
xStep	<number>	0
yStep	<number>	0
xStart	<number> or empty	{}
yStart	<number> or empty	{}
xEnd	<number> or empty	{}
yEnd	<number> or empty	{}
plotNo	<number>	1
plotNoMax	<number>	1
xAxisLabel	<anything>	{\ empty}
yAxisLabel	<anything>	{\ empty}
xAxisLabelPos	<(x,y)> or empty	{\ empty}
yAxisLabelPos	<(x,y)> or empty	{\ empty}
llx	<length>	0pt
lly	<length>	0pt
urx	<length>	0pt
ury	<length>	0pt
polarplot	false true	false

19.1 algebraic

By default the function of `\psplot` has to be described in Reversed Polish Notation. The option `algebraic` allows to do this in the common algebraic notation. E.g.:

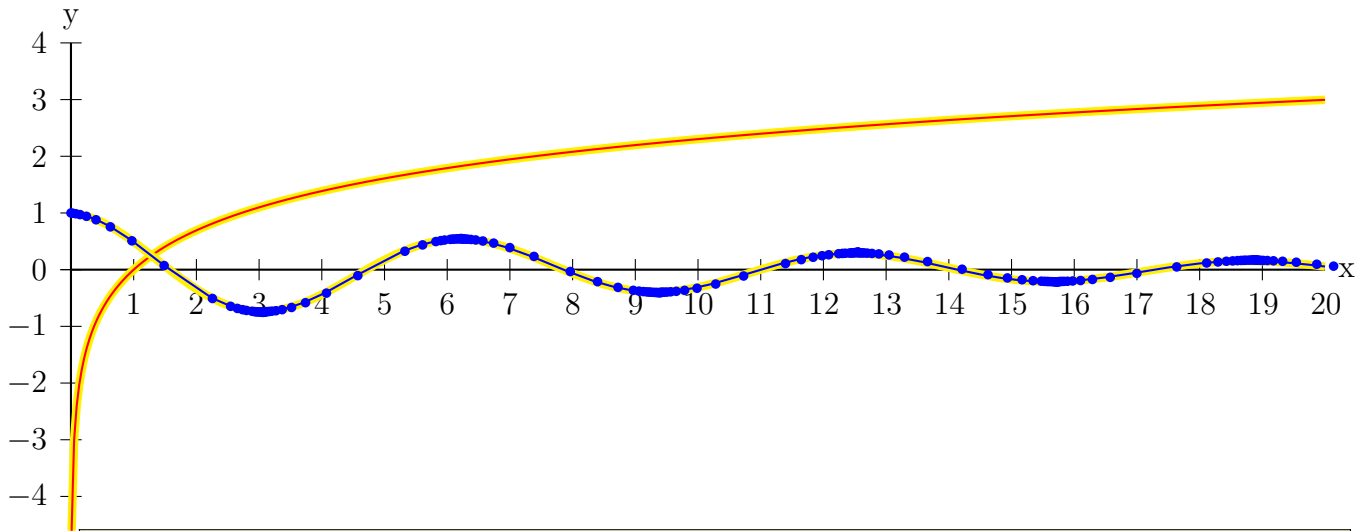
RPN	algebraic
x ln	ln(x)
x cos 2.71 x neg 10 div exp mul	cos(x)*2.71 ^(-x/10)
1 x div cos 4 mul	4*cos(1/x)



```

1 \psgraph(-10,-3)(10,3){\linewidth}{6cm}
2 \psset{algebraic=true, plotpoints=101}
3 \psplot[linecolor=yellow, linewidth=4\pslinewidth]{-10}{10}{3*sin(x)}%
4 \psplot[linecolor=red, showpoints=true, VarStep=0.8]{-10}{10}{3*sin(x)}
5 \endpsgraph

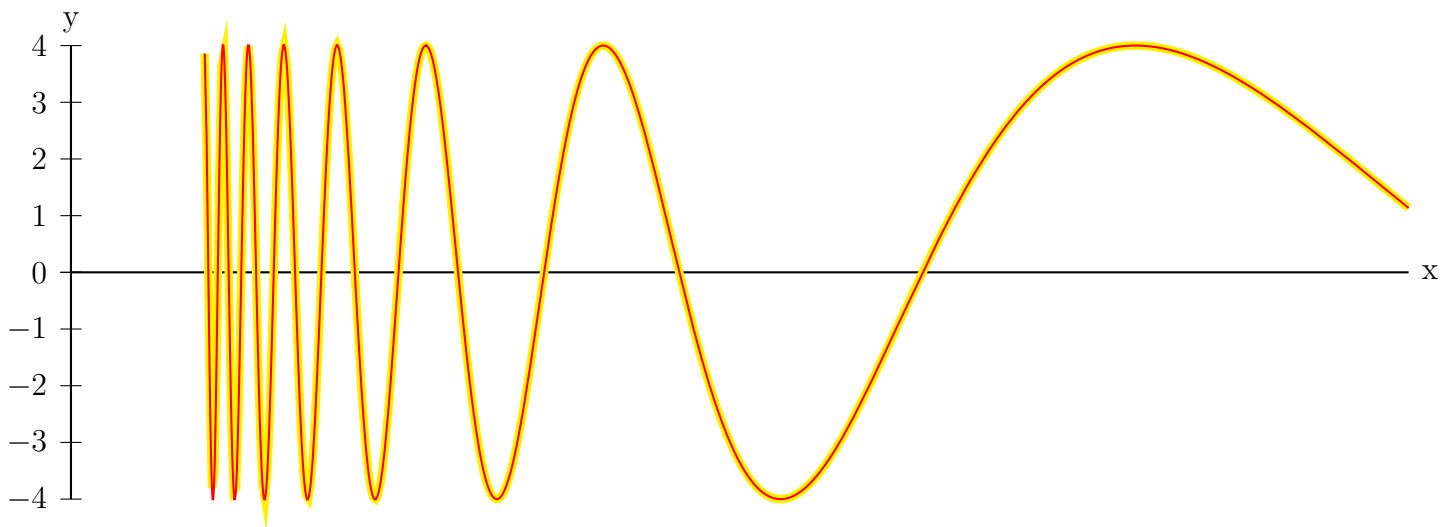
```



```

1 \psgraph(0,-4)(20,4){\linewidth}{6cm}
2 \psset{algebraic=true, plotpoints=501}
3 \psplot[linecolor=yellow, linewidth=4\pslinewidth]{0.01}{20}{ln(x)}%
4 \psplot[linecolor=red]{0.01}{20}{ln(x)}
5 \psplot[linecolor=yellow, linewidth=4\pslinewidth]{0}{20}{cos(x)*2.71^(-
  x/10)}
6 \psplot[linecolor=blue, showpoints=true, VarStep=0.8]{0}{20}{cos(x)
  *2.71^(-x/10)}
7 \endpsgraph

```



```

1 \begin{psgraph}(0,-4)(0.2,4){\linewidth}{6cm}
2   \psset{algebraic=true, plotpoints=501}
3   \psplot[linecolor=yellow, linewidth=4\pslinewidth]{0.02}{.2}{4*cos(1/x)}
4   %
5   \psplot[linecolor=red, VarStep=0.95]{.02}{.2}{4*cos(1/x)}%
6 \end{psgraph}

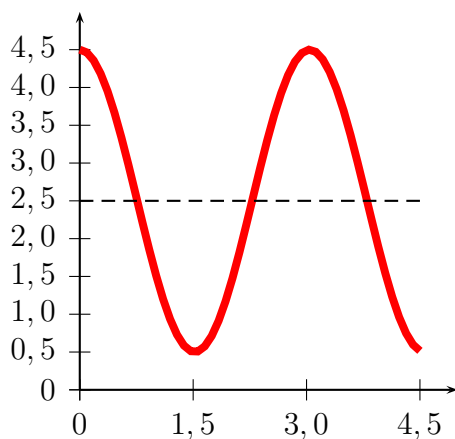
```

19.2 comma

Syntax:

comma=false|true

Setting this option to true gives labels with a comma as a decimal separator instead of the dot. comma and comma=true is the same.



```

1 \begin{pspicture}(-0.5,-0.5)(5,5.5)
2   \psaxes[Dx=1.5,Dy=0.5,comma]{->}(5,5)
3   \psplot[linecolor=red,linewidth=3pt]{0}{4.5}%
4     {x 180 mul 1.52 div cos 2 mul 2.5 add}
5   \psline[linestyle=dashed](0,2.5)(4.5,2.5)
6 \end{pspicture}

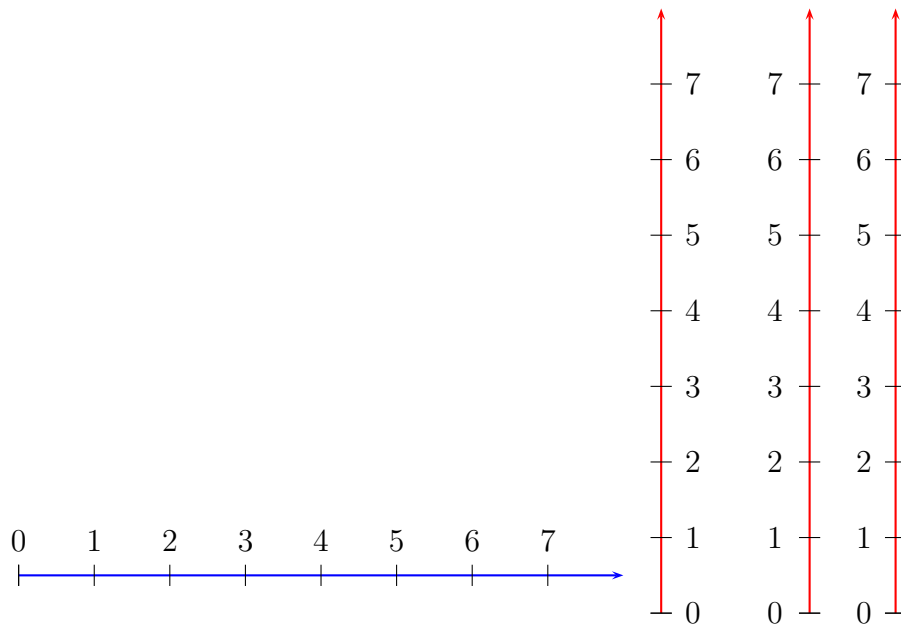
```

19.3 xyAxes, xAxis and yAxis

Syntax:

```
xyAxes=true|false
xAxis=true|false
yAxis=true|false
```

Sometimes there is only a need for one axis with ticks. In this case you can set one of the following options to false. The `xyAxes` makes only sense, when you want to set both, x and y to true with only one command again to the default, because with `xyAxes=false` you get nothing with the `psaxes` macro.



```
1 \begin{pspicture}(8,1)
2 \psaxes[yAxis=false,linecolor=blue]{->}(0,0.5)(8,0.5)
3 \end{pspicture}%
4 \begin{pspicture}(1,8)
5 \psaxes[xAxis=false,linecolor=red]{->}(0.5,0)(0.5,8)
6 \end{pspicture}\hspace{2em}
7 \begin{pspicture}(1,8)
8 \psaxes[xAxis=false,linecolor=red,labelsep=-20pt]{->}(0.5,0)(0.5,8)
9 \end{pspicture}
10 \begin{pspicture}(1,8)
11 \psaxes[xAxis=false,linecolor=red]{->}(0.5,0)(0.501,8)
12 \end{pspicture}%
```

As seen in the example, a single y axis gets the labels on the right side. This can be changed in two ways, first with the option `labelsep` and second with a very short and therefore invisible x-axis (right example).

19.4 xyDecimals, xDecimals and yDecimals

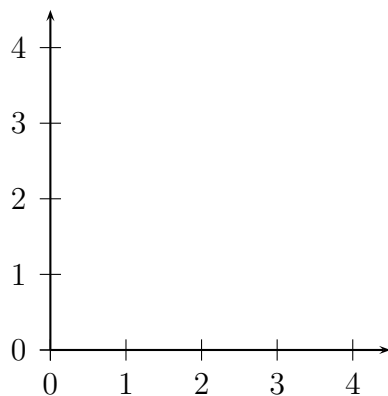
Syntax:

xyDecimals=<number>

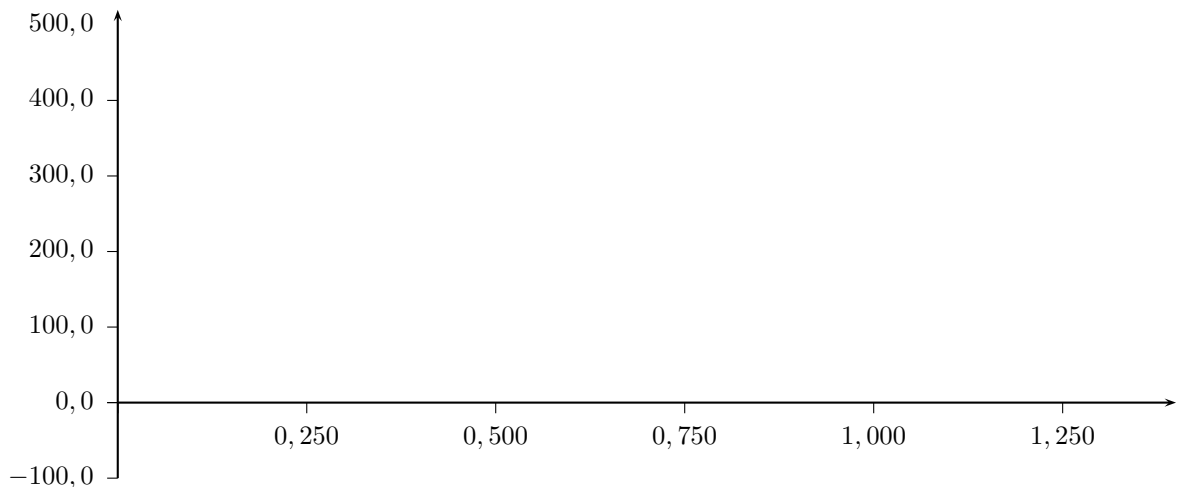
xDecimals=<any>

yDecimals=<any>

By default the labels of the axes get numbers with or without decimals, just depending to the numbers. With these options `xyDecimals` it is possible to determine the decimals, where the option `xyDecimals` sets this identical for both axes. The default setting `{}` means, that you'll get the standard behaviour.



```
1 \begin{pspicture}(-1.5,-0.5)(5,4.75)
2   \psaxes[xyDecimals=2]{->}(0,0)(4.5,4.5)
3 \end{pspicture}
```



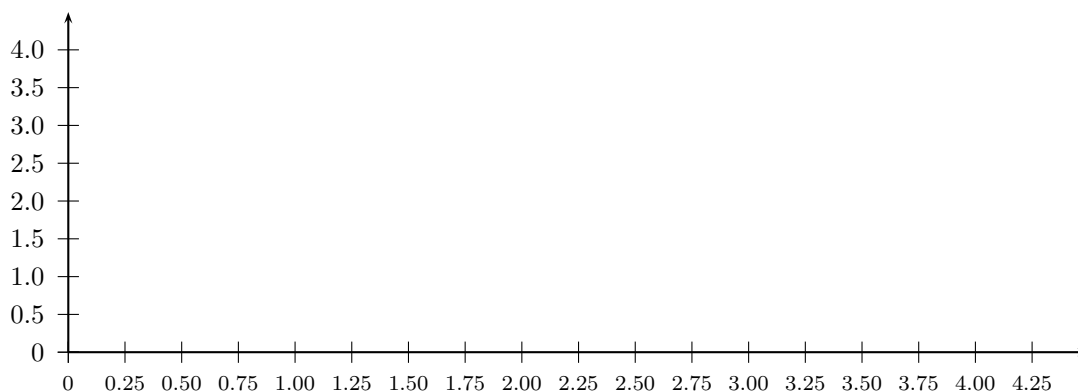
```
1 \psset{xunit=10cm, yunit=0.01cm}
2 \begin{pspicture}(-0.3,-150)(1.5,550.0)
3   \psaxes[Dx=0.25,Dy=100,tickstyle=bottom,xyLabel=\footnotesize,comma=true
4     ,%
5     xDecimals=3,yDecimals=1]{->}(0,0)(0,-100)(1.4,520)
6 \end{pspicture}
```

19.5 xyLabel, xLabel and yLabel

Syntax:

```
xyLabel=<any>  
xLabel=<any>  
yLabel=<any>
```

There are no special keywords to change the labelstyle for the `\psaxes` macro. With `xyLabel` it is possible to set both axes with the same command sequence. Unlike to the default `pst-plot` package the coordinates are not printed in mathmode. This makes it easier to choose other text styles.



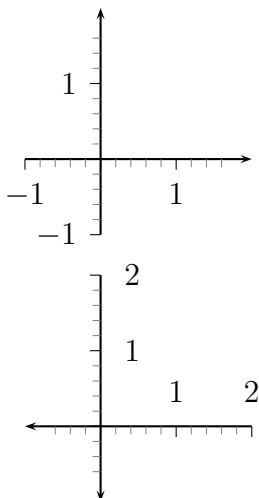
```
1 \psset{yunit=1cm,xunit=3cm}  
2 \begin{pspicture}(-0.3,-0.5)(5,4.75)  
3 \psaxes[xLabel={\scriptsize\itshape},yLabel={\sffamily\footnotesize},%  
4   Dy=0.5, Dx=0.25]{->}(0,0)(4.5,4.5)  
5 \end{pspicture}
```

19.6 tickstyle

Syntax:

```
tickstyle=full|bottom|top
```

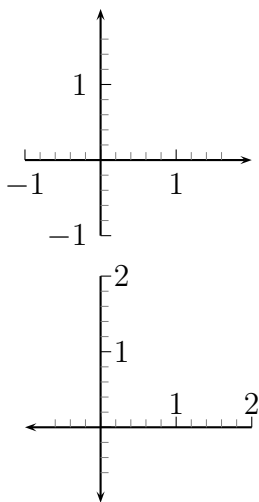
This option is already in the `pst-plot` package and only mentioned here for some completeness.



```

1 \begin{pspicture}(-1,-1)(2,2)
2 \psaxes[tickstyle=bottom,subticks=5]{->}(0,0)(-1,-1)
   (2,2)
3 \end{pspicture}\!\![0.5cm]
4 \begin{pspicture}(-1,-1)(2,2)
5 \psaxes[tickstyle=bottom,subticks=5]{->}(0,0)(2,2)
   (-1,-1)
6 \end{pspicture}

```



```

1 \begin{pspicture}(-1,-1)(2,2)
2 \psaxes[tickstyle=top,subticks=5]{->}(0,0)(-1,-1)(2,2)
3 \end{pspicture}\!\![0.5cm]
4 \begin{pspicture}(-1,-1)(2,2)
5 \psaxes[tickstyle=top,subticks=5]{->}(0,0)(2,2)(-1,-1)
6 \end{pspicture}

```

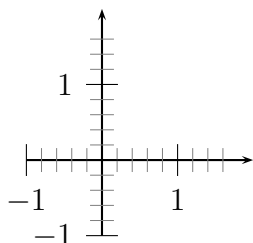
The `tickstyle` option changes the position of the labels by default. If you want the labels on the other side of an axis, then use the options `labelsep` or set the ticks with `ticksize`.

19.7 ticks

Syntax:

`ticks=all|x|y|none`

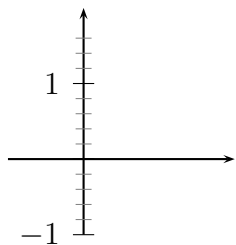
This option is also already in the `pst-plot` package and only mentioned here for some completeness.



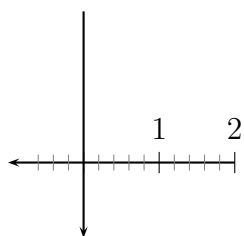
```

1 \psset{ticksize=6pt}
2 \begin{pspicture}(-1,-1)(2,2)
3 \psaxes[ticks=all,subticks=5]{->}(0,0)(-1,-1)(2,2)
4 \end{pspicture}

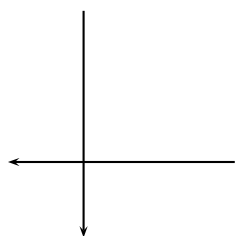
```



```
1 \begin{pspicture}(-1,-1)(2,2)
2 \psaxes[ticks=y,subticks=5]{->}(0,0)(-1,-1)(2,2)
3 \end{pspicture}
```



```
1 \begin{pspicture}(-1,-1)(2,2)
2 \psaxes[ticks=x,subticks=5]{->}(0,0)(2,2)(-1,-1)
3 \end{pspicture}
```



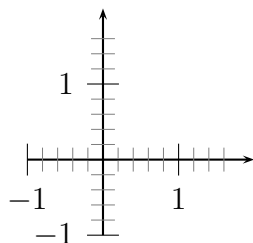
```
1 \begin{pspicture}(-1,-1)(2,2)
2 \psaxes[ticks=none,subticks=5]{->}(0,0)(2,2)(-1,-1)
3 \end{pspicture}
```

19.8 labels

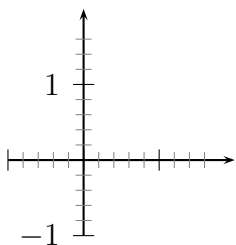
Syntax:

`labels=all|x|y|none`

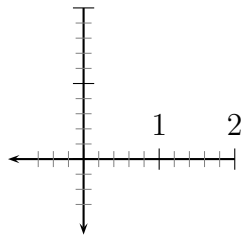
This option is also already in the `pst-plot` package and only mentioned here for some completeness.



```
1 \psset{ticksize=6pt}
2 \begin{pspicture}(-1,-1)(2,2)
3 \psaxes[labels=all,subticks=5]{->}(0,0)(-1,-1)(2,2)
4 \end{pspicture}
```



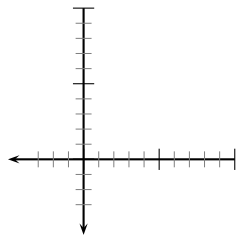
```
1 \begin{pspicture}(-1,-1)(2,2)
2 \psaxes[labels=y,subticks=5]{->}(0,0)(-1,-1)(2,2)
3 \end{pspicture}
```



```

1 \begin{pspicture}(-1,-1)(2,2)
2 \psaxes[labels=x,subticks=5]{->}(0,0)(2,2)(-1,-1)
3 \end{pspicture}

```



```

1 \begin{pspicture}(-1,-1)(2,2)
2 \psaxes[labels=none,subticks=5]{->}(0,0)(2,2)(-1,-1)
3 \end{pspicture}

```

19.9 ticksize, xticksize, yticksize

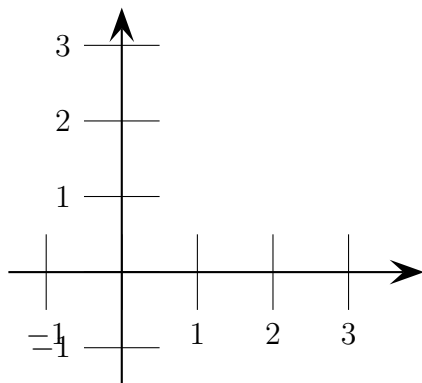
Syntax:

```

ticksize=value[unit]
ticksize=value[unit] value[unit]
xticksize=value[unit]
xticksize=value[unit] value[unit]
yticksize=value[unit]
yticksize=value[unit] value[unit]

```

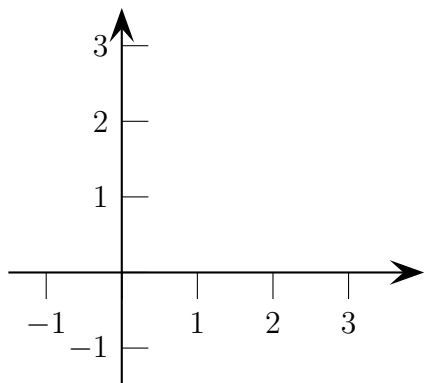
ticksize sets both values.



```

1 \psset{arrowscale=3}
2 \begin{pspicture}(-1.5,-1.5)(4,3.5)
3   \psaxes[ticksize=0.5cm]{->}(0,0)
4     (-1.5,-1.5)(4,3.5)
5 \end{pspicture}

```

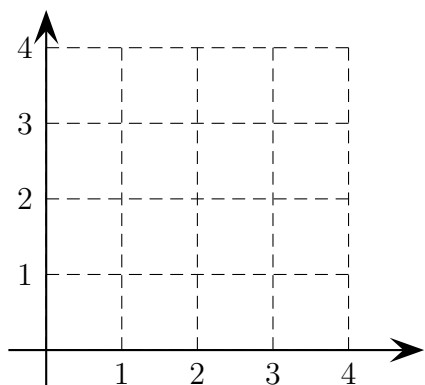


```

1 \psset{arrowscale=3}
2 \begin{pspicture}(-1.5,-1.5)(4,3.5)
3   \psaxes[xticks=-10pt 0,yticks=0 10pt
4     ]{->}(0,0)(-1.5,-1.5)(4,3.5)
5 \end{pspicture}

```

A grid is also possible by setting the values to the max/min coordinates.



```

1 \psset{arrowscale=3}
2 \begin{pspicture}(-.5,-.5)(5,4.5)
3   \psaxes[ticklinestyle=dashed,ticks=0 4
4     cm]{->}(0,0)(-.5,-.5)(5,4.5)
5 \end{pspicture}

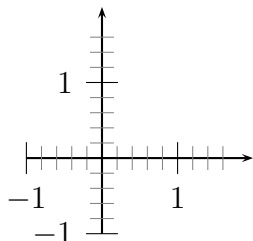
```

19.10 subticks

Syntax:

`subticks=<number>`

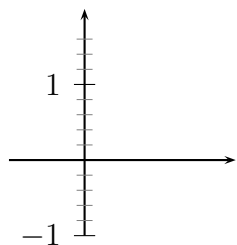
By default subticks cannot have labels.



```

1 \psset{ticksize=6pt}
2 \begin{pspicture}(-1,-1)(2,2)
3   \psaxes[ticks=all,subticks=5]{->}(0,0)(-1,-1)(2,2)
4 \end{pspicture}

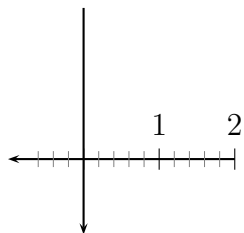
```



```

1 \begin{pspicture}(-1,-1)(2,2)
2   \psaxes[ticks=y,subticks=5]{->}(0,0)(-1,-1)(2,2)
3 \end{pspicture}

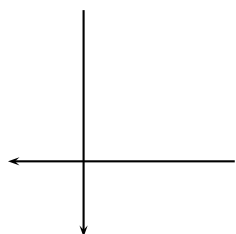
```



```

1 \begin{pspicture}(-1,-1)(2,2)
2 \psaxes[ticks=x,subticks=5]{->}(0,0)(2,2)(-1,-1)
3 \end{pspicture}

```



```

1 \begin{pspicture}(-1,-1)(2,2)
2 \psaxes[ticks=none,subticks=5]{->}(0,0)(2,2)(-1,-1)
3 \end{pspicture}

```

19.11 subticksize, xsubticksize, ysubticksize

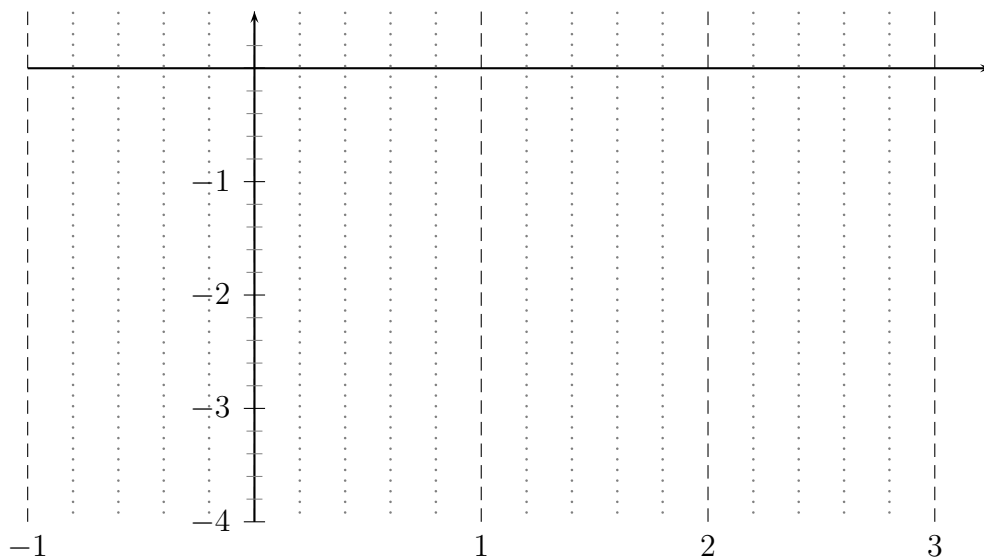
Syntax:

```

subticksize=value
xsubticksize=value
ysubticksize=value

```

`subticksize` sets both values, which are relative to the `ticksize` length and can have any number. 1 sets it to the same length as the main ticks.



```

1 \psset{yunit=1.5cm,xunit=3cm}
2 \begin{pspicture}(-1.25,-4.5)(3.25,.75)
3   \psaxes[xticks=-4 0.5,ticklinestyle=dashed,subticks=5,xsubticksize=1,
4     %
5     ysubticksize=0.75,xsubticklinestyle=dotted,xsubtickwidth=1pt,
6     subtickcolor=gray]{->}(0,0)(-1,-4)(3.25,0.5)
\end{pspicture}

```

19.12 tickcolor, subtickcolor

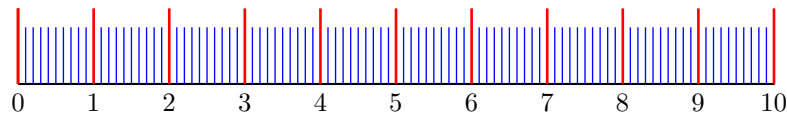
Syntax:

```

tickcolor=<color>
xtickcolor=<color>
ytickcolor=<color>
subtickcolor=<color>
xsubtickcolor=<color>
ysubtickcolor=<color>

```

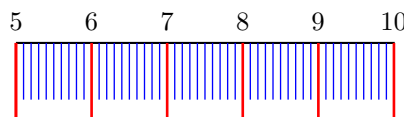
tickcolor and subtickcolor set both for the x- and the y-Axis.



```

1 \begin{pspicture}(0,-0.75)(10,1)
2 \psaxes[xLabel=\footnotesize,labelsep=2pt,yAxis=false,%
3   labelsep=-10pt,ticksize=0 10mm,subticks=10,subticksize=0.75,%
4   tickcolor=red,subtickcolor=blue,tickwidth=1pt,%
5   subtickwidth=0.5pt](10.01,0)
6 \end{pspicture}

```



```

1 \begin{pspicture}(5,-0.75)(10,1)
2 \psaxes[xLabel=\footnotesize,labelsep=2pt,yAxis=
3   false,%
4   labelsep=5pt,ticksize=0 -10mm,subticks=10,
5   subticksize=0.75,%
6   tickcolor=red,subtickcolor=blue,tickwidth=1pt,%
7   subtickwidth=0.5pt,0x=5](5,0)(5,0)(10.01,0)
\end{pspicture}

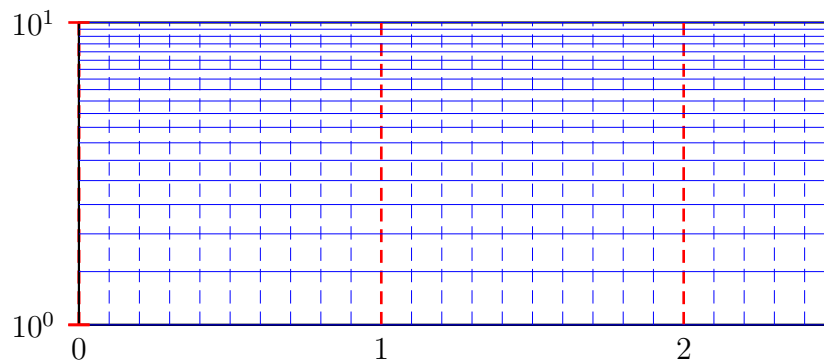
```


19.13 ticklinestyle and subticklinestyle

Syntax:

```
ticklinestyle=solid|dashed|dotted|none
xticklinestyle=solid|dashed|dotted|none
yticklinestyle=solid|dashed|dotted|none
subticklinestyle=solid|dashed|dotted|none
xsubticklinestyle=solid|dashed|dotted|none
ysubticklinestyle=solid|dashed|dotted|none
```

`ticklinestyle` and `subticklinestyle` set both values for the x and y axis. The value `none` doesn't really makes sense, because it is the same to `[sub]ticklines=0`

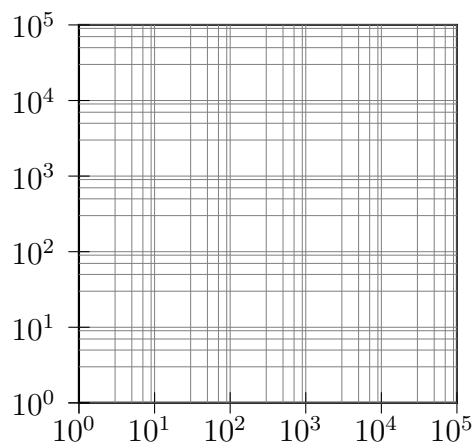


```
1 \psset{unit=4cm}
2 \pspicture(-0.15,-0.15)(2.5,1)
3   \psaxes[axesstyle=frame,logLines=y,xticks=0 1,xsubticks=1,%
4     ylogBase=10,tickcolor=red,subtickcolor=blue,tickwidth=1pt,%
5     subticks=20,xsubticks=10,xticklinestyle=dashed,%
6     xsubticklinestyle=dashed](2.5,1)
7 \endpspicture
```

19.14 loglines

Syntax:

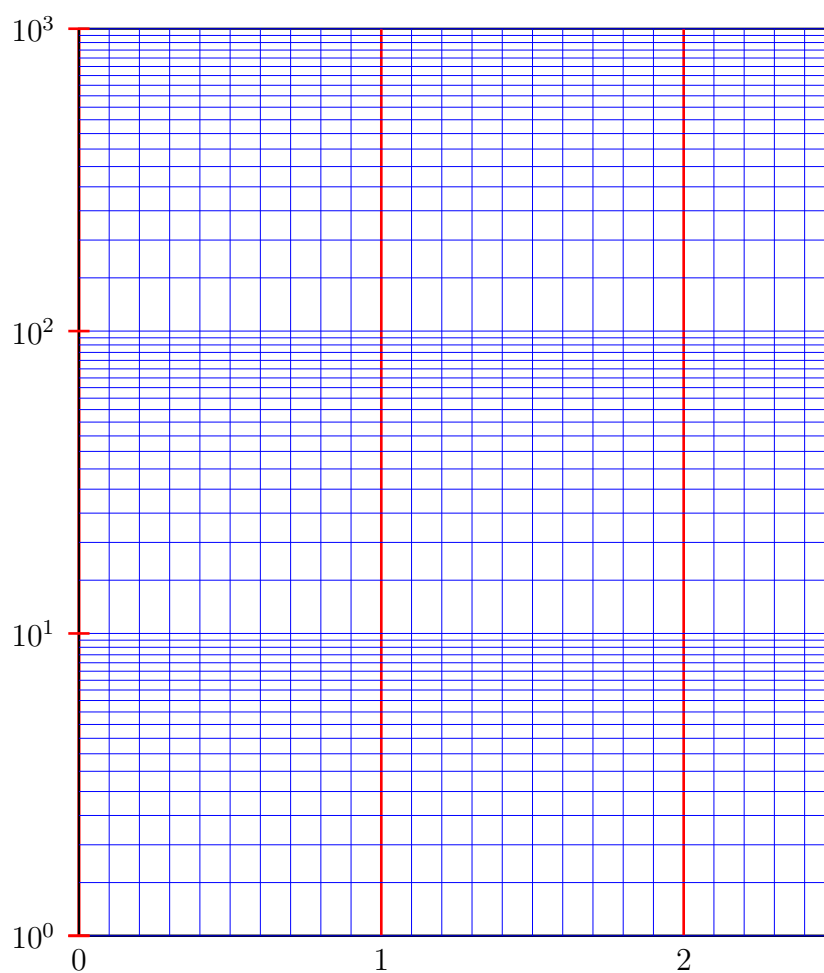
```
loglines=all|x|y
```



```

1 \pspicture(0,-1)(5,5)
2   \psaxes[subticks=5,axesstyle=frame,
3     xylogBase=10,logLines=all](5,5)
4 \endpspicture

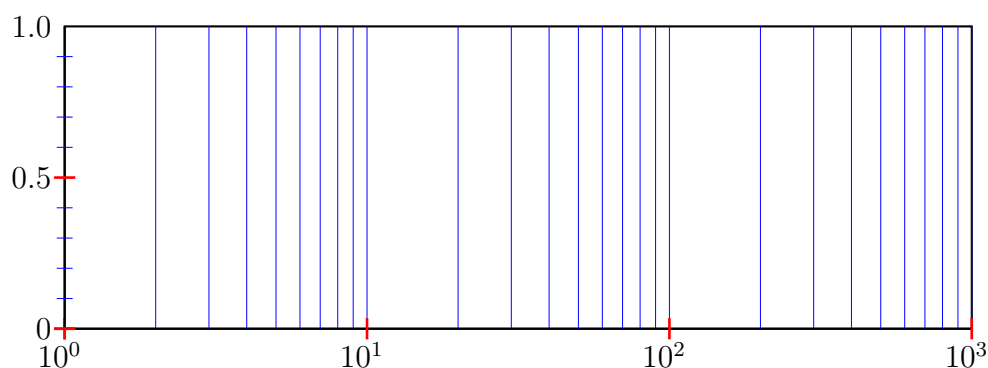
```



```

1 \psset{unit=4cm}
2 \pspicture(-0.15,-0.15)(2.5,3)
3   \psaxes[axesstyle=frame,logLines=y,xticksize=0.3,xsubticksize=1,%
4     ylogBase=10,tickcolor=red,subtickcolor=blue,tickwidth=1pt,%
5     subticks=20,xsubticks=10](2.5,3)
6 \endpspicture

```



```

1 \psset{unit=4}
2 \pspicture(0,-0.3)(3,1.2)
3   \psaxes[axesstyle=frame,logLines=x,xlogBase=10,Dy=0.5,%
4     tickcolor=red,subtickcolor=blue,tickwidth=1pt,ysubticks=5,xsubticks
5     =10](3,1)
6 \endpspicture

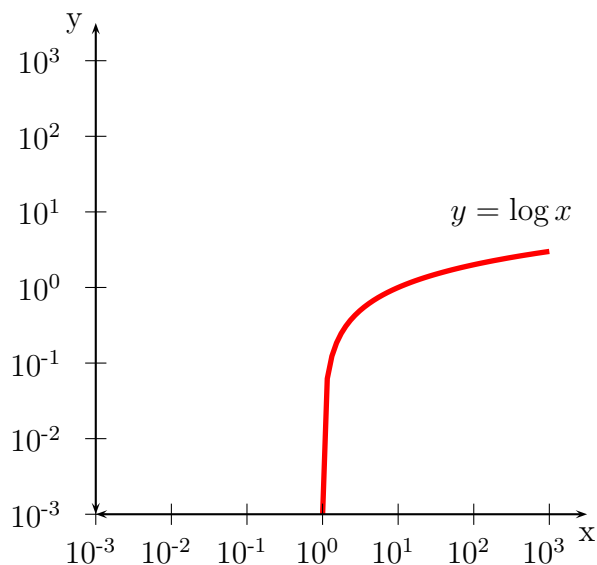
```

19.15 xylogBase, xlogBase and ylogBase

There are additional options `xylogBase` `xlogBase` | `ylogBase` to get one or both axes with logarithm labels. For an interval of $[10^{-3} \dots 10^2]$ choose a `pstricks` interval of $[-3, 2]$. `pstricks` takes 0 as the origin of this axes, which is wrong if we want to have a logarithm axes. With the options `Oy` and `Ox` we can set the origin to -3 , so that the first label gets 10^{-3} . If this is not done by the user then `pstricks-add` does it by default. An alternative is to set these parameters to empty values `Ox={}`, `Oy={}`, in this case `pstricks-add` does nothing.

19.15.1 xylogBase

This mode is in math also called double logarithm. It is a combination of the two forgoing modes and the function is now $y = \log x$ and is shown in the following example.



```

1 \begin{pspicture}(-3.5,-3.5)(3.5,3.5)
2   \psplot[linewidth=2pt,linecolor=red
3     ]{0.001}{3}{x log}
4   \psaxes[xylogBase=10,0y
5     =-3]{<->}(-3,-3)(3.5,3.5)
6   \uput[-90](3.5,-3){x}
7   \uput[180](-3,3.5){y}
8   \rput(2.5,1){$y=\log x$}
9 \end{pspicture}

```

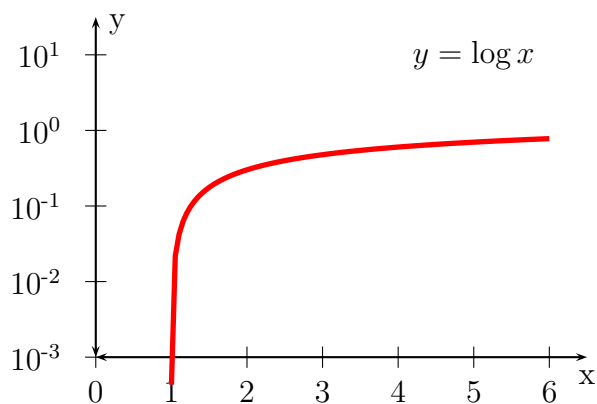
19.15.2 ylogBase

The values for the **psaxes** y-coordinate are now the exponents to the base 10 and for the right function to the base e : $10^{-3} \dots 10^1$ which corresponds to the given y-intervall $-3 \dots 1.5$, where only integers as exponents are possible. These logarithm labels have no effect to the internal used units. To draw the logarithm function we have to use the math function

$$y = \log\{\log x\}$$

$$y = \ln\{\ln x\}$$

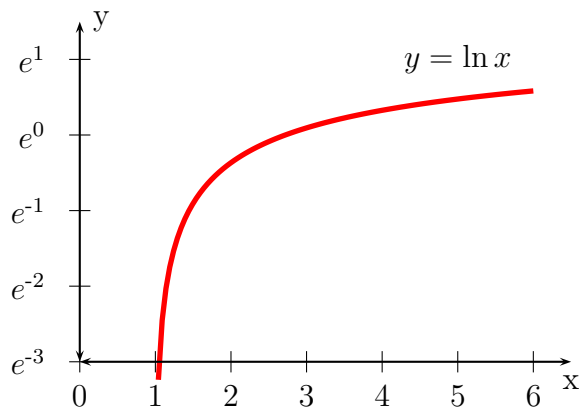
with an drawing intervall of $1.001 \dots 6$.



```

1 \begin{pspicture}(-0.5,-3.5)(6.5,1.5)
2   \psaxes[ylogBase=10]{<->}(0,-3)
3     (6.5,1.5)
4   \uput[-90](6.5,-3){x}
5   \uput[0](0,1.4){y}
6   \rput(5,1){$y=\log x$}
7   \psplot[linewidth=2pt,%
8     plotpoints=100,linecolor=red
9     ]{1.001}{6}{x log log} % log(x)
10 \end{pspicture}

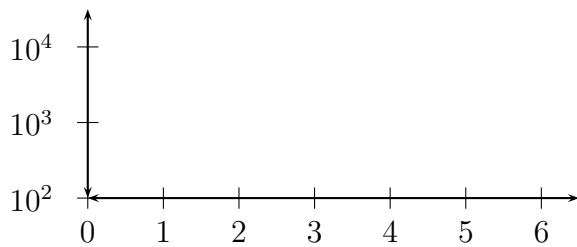
```



```

1 \begin{pspicture}(-0.5,-3.5)(6.5,1.5)
2   \psplot[linewidth=2pt,plotpoints=100,
3     linecolor=red]{1.04}{6}{/ln {\log 0.4343 div} def x
4     ln ln} % log(x)
5   \psaxes[ylogBase=e]{<->}(0,-3)
6     (6.5,1.5)
7   \uput[-90](6.5,-3){x}
8   \uput[0](0,1.5){y}
9   \rput(5,1){$y=\ln x$}
10 \end{pspicture}

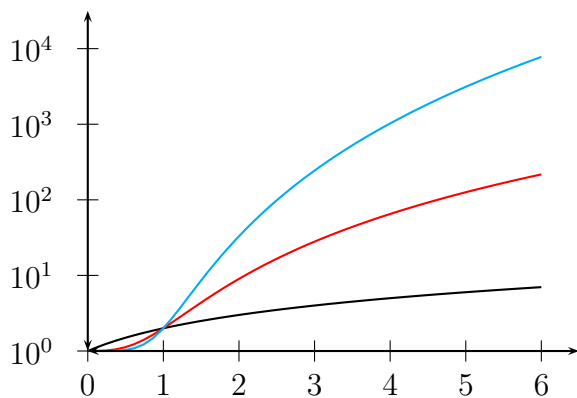
```



```

1 \begin{pspicture}(-0.5,1.75)(6.5,4.5)
2   \psaxes[ylogBase=10,0y=2]{<->}(0,2)
3     (0,2)(6.5,4.5)
4 \end{pspicture}

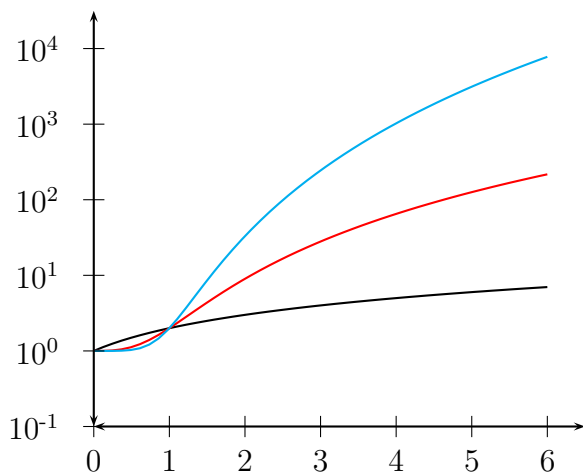
```



```

1 \begin{pspicture}(-0.5,-0.25)(6.5,4.5)
2   \psplot{0}{6}{x x cos add log}
3     % x^3 + cos(x)
4   \psplot[linecolor=red]{0}{6}{x 3 exp x
5     cos add log} % x^3 + cos(x)
6   \psplot[linecolor=cyan]{0}{6}{x 5 exp
7     x cos add log} % x^5 + cos(x)
8   \psaxes[ylogBase=10]{<->}(6.5,4.5)
9 \end{pspicture}

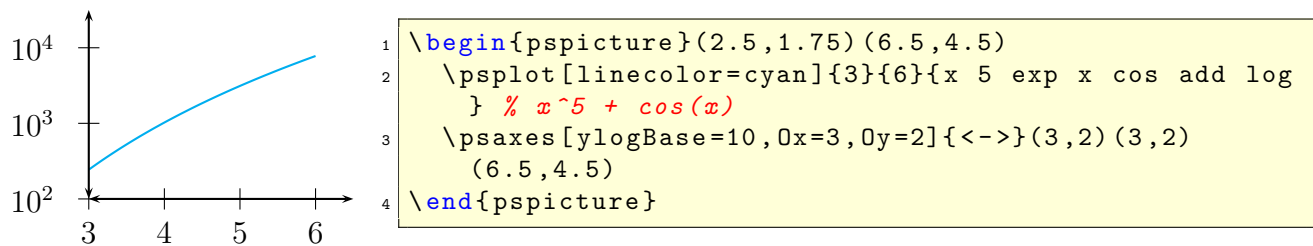
```



```

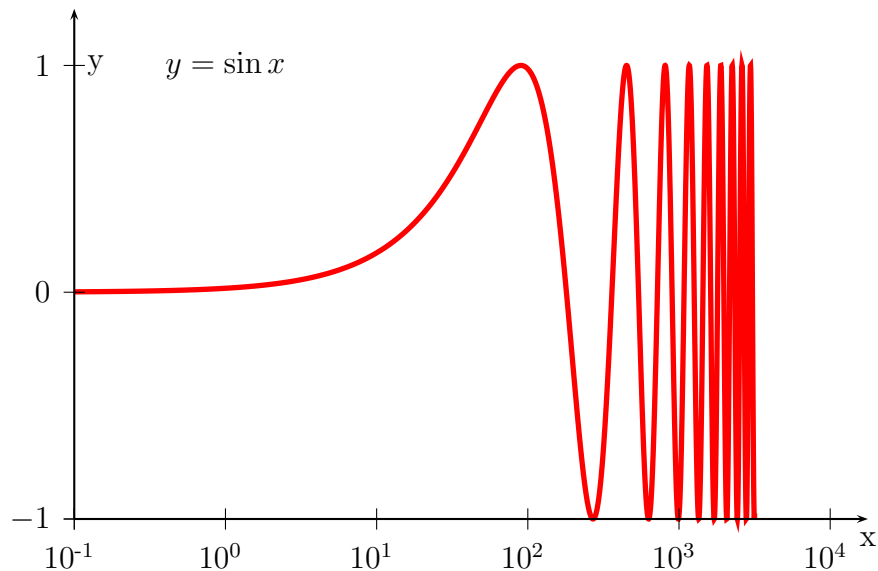
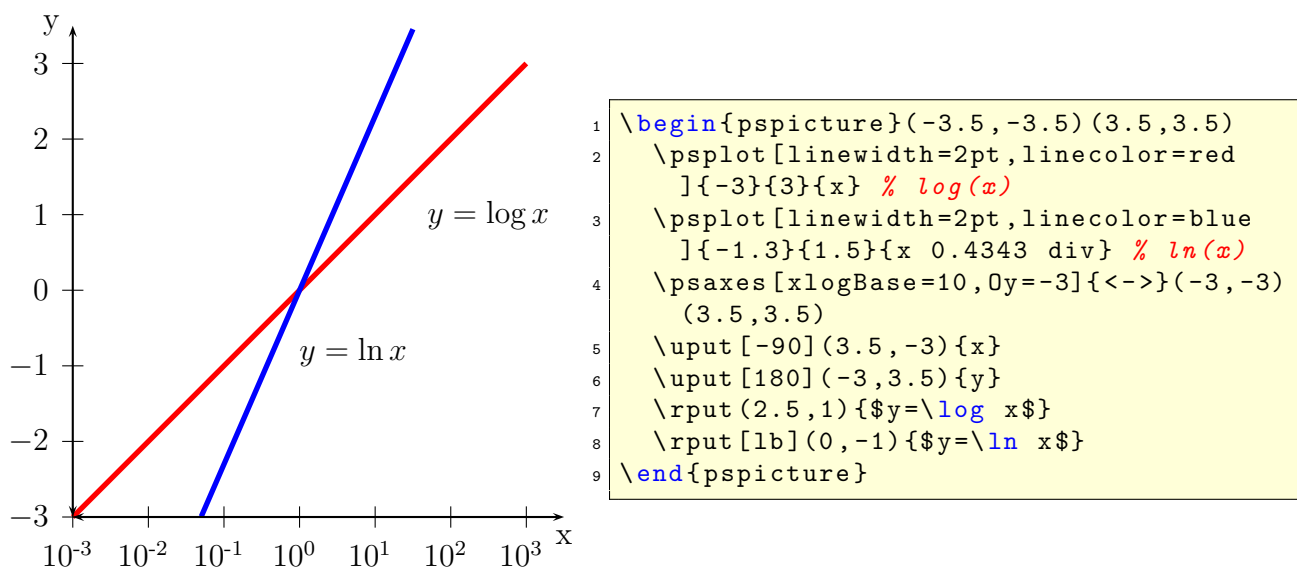
1 \begin{pspicture}(-0.5,-1.25)(6.5,4.5)
2   \psplot{0}{6}{x x cos add log}
3     % x^3 + cos(x)
4   \psplot[linecolor=red]{0}{6}{x 3 exp x
5     cos add log} % x^3 + cos(x)
6   \psplot[linecolor=cyan]{0}{6}{x 5 exp
7     x cos add log} % x^5 + cos(x)
8   \psaxes[ylogBase=10]{<->}(0,-1)(0,-1)
9     (6.5,4.5)
10 \end{pspicture}

```



19.15.3 xlogBase

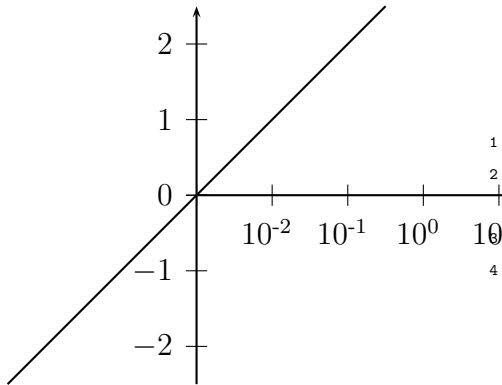
Now we have to use the easy math function $y = x$ because the x axis is still $\log x$.



```

1 \psset{yunit=3cm,xunit=2cm}
2 \begin{pspicture}(-1.25,-1.25)(4.25,1.5)
3   \uput[-90](4.25,-1){x}
4   \uput[0](-1,1){y}
5   \rput(0,1){$y=\sin x$}
6   \psplot[linewidth=2pt,plotpoints=5000,linecolor=red]{-1}{3.5}{10 x exp
   sin }
7   \psaxes[xlogBase=10,0y=-1]{->}(-1,-1)(4.25,1.25)
8 \end{pspicture}

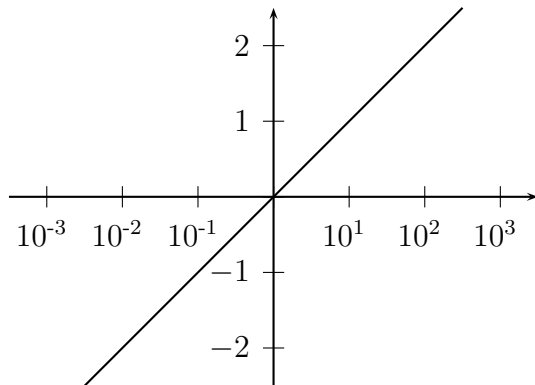
```



```

1 \begin{pspicture}(-3.5,-2.5)(3.5,2.5)
2   \psaxes[xlogBase=10]{->}(0,0)
   (-3.5,-2.5)(3.5,2.5)
3   \psplot{-2.5}{2.5}{10 x exp log}
4 \end{pspicture}

```



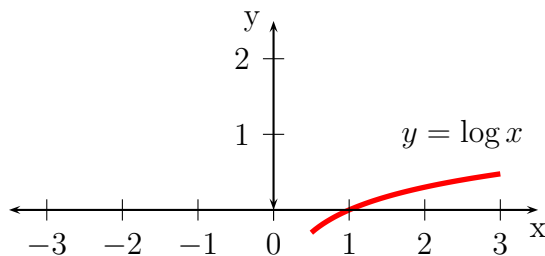
```

1 \begin{pspicture}(-3.5,-2.5)(3.5,2.5)
2   \psaxes[xlogBase=10,0x={},0y
   ={}]{->}(0,0)(-3.5,-2.5)(3.5,2.5)
3   \psplot{-2.5}{2.5}{10 x exp log}
4 \end{pspicture}

```

19.15.4 No logstyle (xylogBase={})

This is only a demonstration that the default option `logBase={}` still works ... :-)

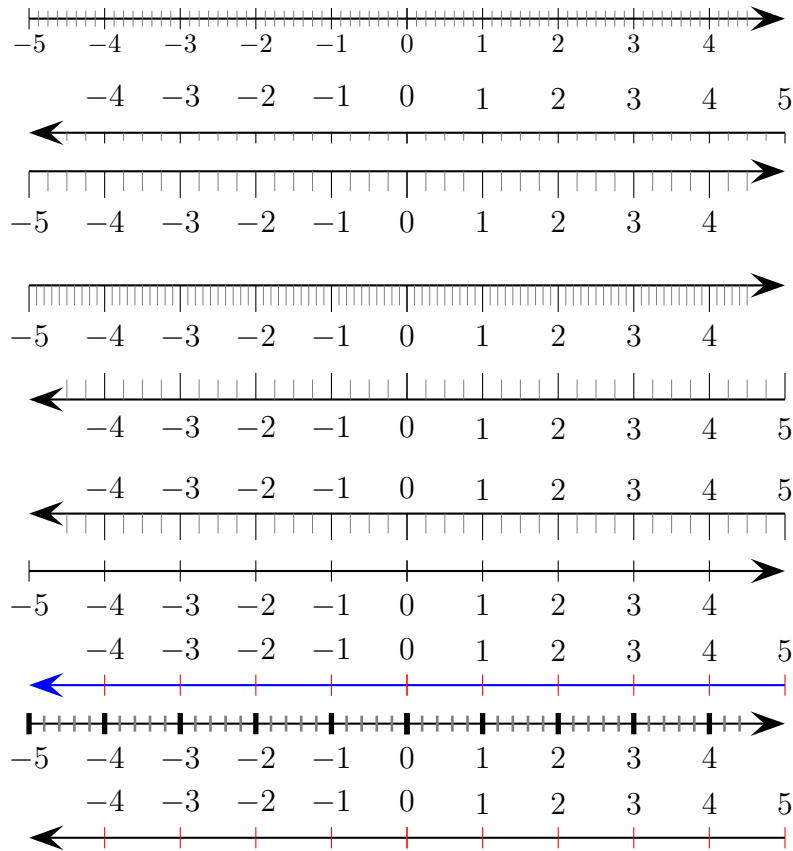


```

1 \begin{pspicture}(-3.5,-0.5)(3.5,2.5)
2   \psplot[linewidth=2pt,linecolor=red,
   xylogBase={}]{0.5}{3}{x log} % log(x
   )
3   \psaxes{<->}(0,0)(-3.5,0)(3.5,2.5)
4   \uput[-90](3.5,0){x}
5   \uput[180](0,2.5){y}
6   \rput(2.5,1){$y=\log x$}
7 \end{pspicture}

```

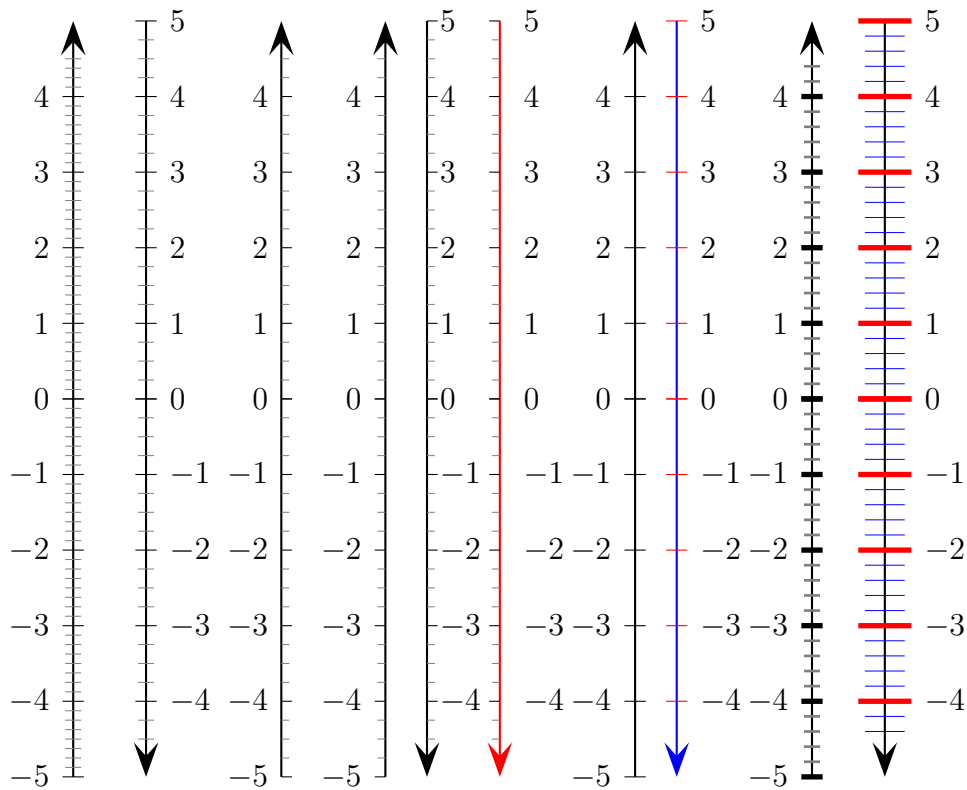
19.16 subticks, tickwidth and subtickwidth



```

1 \psset{arrowscale=3}
2 \psaxes[xLabel=\footnotesize,labelsep=2pt,yAxis=false,subticks
   =8]{->}(0,0)(-5,-1)(5,1)\[1cm]
3 \psaxes[yAxis=false,subticks=4,tickstyle=bottom]{->}(0,0)(5,1)(-5,-1)
   \[1cm]
4 \psaxes[yAxis=false,subticks=4,ticksize=-10pt 0]{->}(0,0)(-5,-5)(5,5)
   \[1cm]
5 \psaxes[yAxis=false,subticks=10,ticksize=0 -10pt,labelsep=15pt
   ]{->}(0,0)(-5,-5)(5,5)\[1cm]
6 \psaxes[yAxis=false,subticks=4,ticksize=0 10pt,labelsep=-15pt
   ]{->}(0,0)(5,5)(-5,-5)\[1cm]
7 \psaxes[yAxis=false,subticks=4,ticksize=0 -10pt]{->}(0,0)(5,5)(-5,-5)
   \[0.25cm]
8 \psaxes[yAxis=false,subticks=0]{->}(0,0)(-5,-5)(5,5)\[1cm]
9 \psaxes[yAxis=false,subticks=0,tickcolor=red,linecolor=blue]{->}(0,0)
   (5,5)(-5,-5)\[1cm]
10 \psaxes[yAxis=false,subticks=5,tickwidth=2pt,subtickwidth=1pt
   ]{->}(0,0)(-5,-5)(5,5)\[1cm]
11 \psaxes[yAxis=false,subticks=0,tickcolor=red]{->}(0,0)(5,5)(-5,-5)

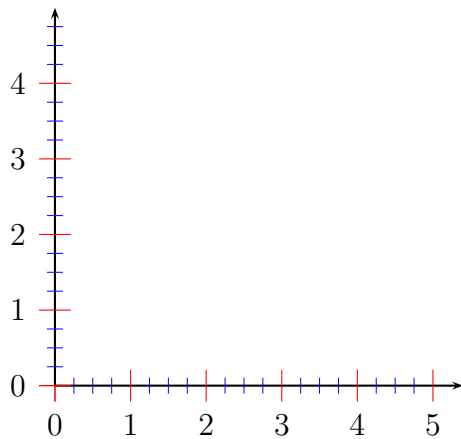
```

```

1 \psset{arrowscale=3}
2 \psaxes[xAxis=false,subticks=8]{->}(0,0)(-5,-5)(5,5)\hspace{2em}
3 \psaxes[xAxis=false,subticks=4]{->}(0,0)(5,5)(-5,-5)\hspace{4em}
4 \psaxes[xAxis=false,subticks=4,tickstyle=top]{->}(0,0)(-5,-5)(5,5)\
   \hspace{3em}
5 \psaxes[xAxis=false,subticks=4,tickstyle=bottom]{->}(0,0)(-5,-5)(5,5)\
   \hspace{1em}
6 \psaxes[xAxis=false,subticks=4,tickstyle=top]{->}(0,0)(5,5)(-5,-5)\
   \hspace{2em}
7 \psaxes[xAxis=false,subticks=4,tickstyle=bottom,linecolor=red
   ]{->}(0,0)(5,5)(-5,-5)\hspace{4em}
8 \psaxes[xAxis=false,subticks=0]{->}(0,0)(-5,-5)(5,5)\hspace{1em}
9 \psaxes[xAxis=false,subticks=0,tickcolor=red,linecolor=blue]{->}(0,0)
   (5,5)(-5,-5)\hspace{4em}
10 \psaxes[xAxis=false,subticks=5,tickwidth=2pt,subtickwidth=1pt
   ]{->}(0,0)(-5,-5)(5,5)\hspace{2em}
11 \psaxes[xAxis=false,subticks=5,tickcolor=red,tickwidth=2pt,%
12   ticksize=10pt,subtickcolor=blue,subticksize=0.75]{->}(0,0)(5,5)
   (-5,-5)

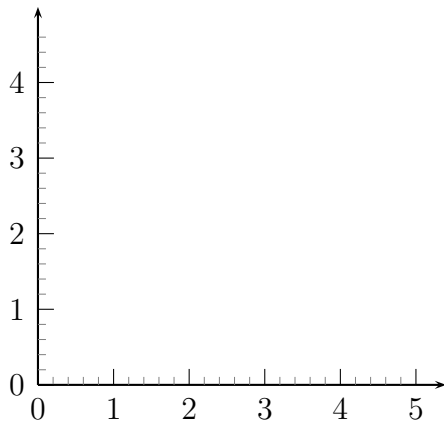
```



```

1 \pspicture(5,5.5)
2 \psaxes[subticks=4,ticks=6pt,subticks=
  =0.5,%
3   tickcolor=red,subtickcolor=blue]{->}(5.4,5)
4 \endpspicture

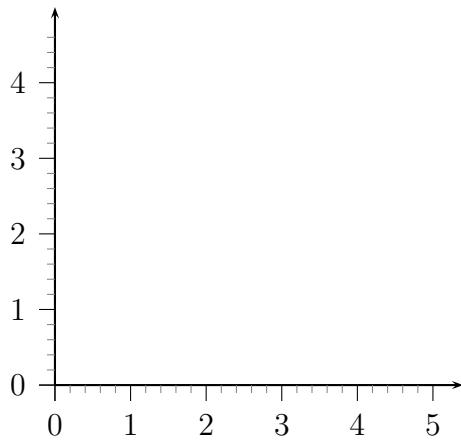
```



```

1 \pspicture(5,5.5)
2 \psaxes[subticks=5,ticks=6pt,subticks=
  =0.5,tickstyle=top]{->}(5.4,5)
3 \endpspicture

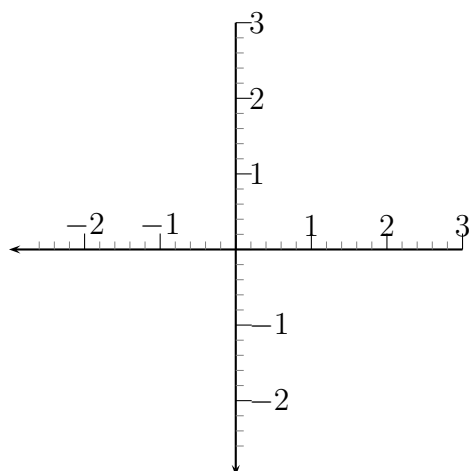
```



```

1 \pspicture(5,5.5)
2 \psaxes[subticks=5,ticks=6pt,subticks=
  =0.5,tickstyle=bottom]{->}(5.4,5)
3 \endpspicture

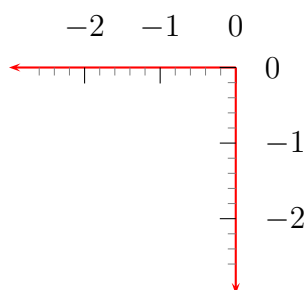
```



```

1 \pspicture(-3,-3)(3,3.5)
2   \psaxes[subticks=5,ticksize=6pt,
3     subticksize=0.5,tickstyle=top
4     ]{->}(0,0)(3,3)(-3,-3)
5 \endpspicture

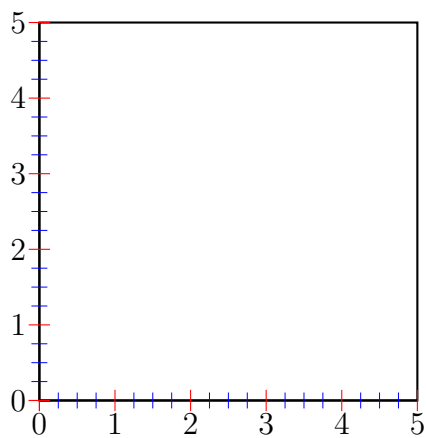
```



```

1 \pspicture(0,0.5)(-3,-3)
2   \psaxes[subticks=5,ticksize=6pt,
3     subticksize=0.5,%
4     tickstyle=bottom,linecolor=red
5     ]{->}(-3,-3)
6 \endpspicture

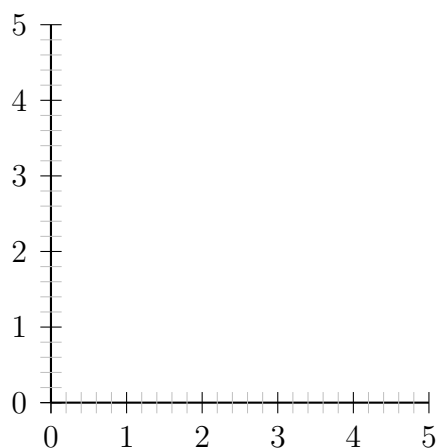
```



```

1 \psset{axesstyle=frame}
2 \pspicture(5,5.5)
3   \psaxes[subticks=4,tickcolor=red,
4     subtickcolor=blue](5,5)
5 \endpspicture

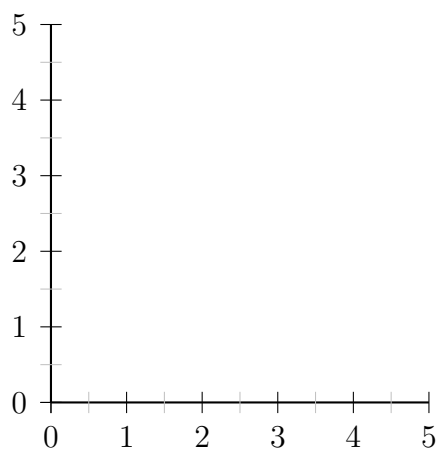
```



```

1 \pspicture(5,5.5)
2   \psaxes[subticks=5,subticksize=1,
3     subtickcolor=lightgray](5,5)
4 \endpspicture

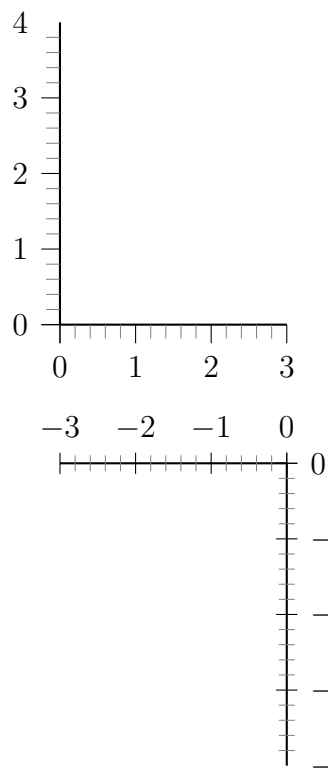
```



```

1 \pspicture(5,5.5)
2   \psaxes[subticks=2,subticksize=1,
3     subtickcolor=lightgray](5,5)
4 \endpspicture

```



```

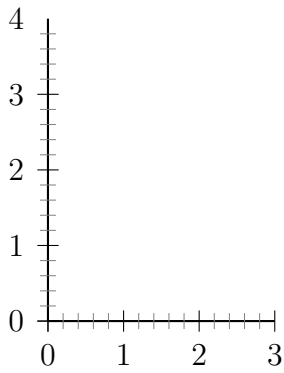
1 \pspicture(3,4.5)
2   \psaxes[subticks=5,ticksize=-7pt 0](3,4)
3 \endpspicture

```

```

1 \pspicture(0,1)(-3,-4)
2   \psaxes[subticks=5](-3,-4)
3 \endpspicture

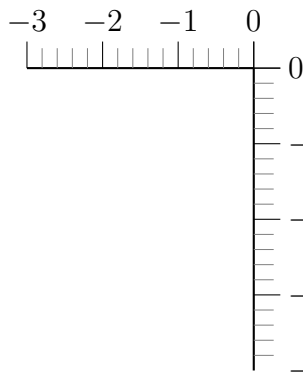
```



```

1 \pspicture(3,4.5)
2   \psaxes[axesstyle=axes,subticks=5](3,4)
3 \endpspicture

```



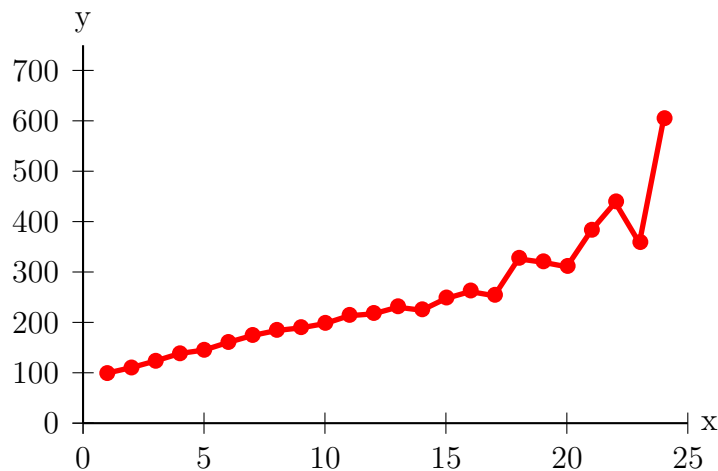
```

1 \pspicture(0,1)(-3,-4)
2   \psaxes[axesstyle=axes,subticks=5,%
3     ticksize=0 10pt,labelsep=13pt](-3,-4)
4 \endpspicture

```

19.17 xlabelFactor and ylabelFactor

When having big numbers as data records then it makes sense to write the values as $< number > \cdot 10^{<exp>}$. These new options allow to define the additional part of the value.



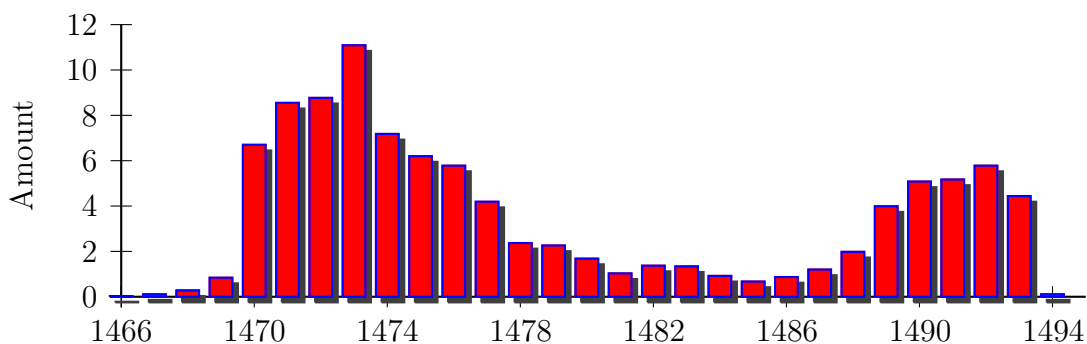
```

1 \readdata{\data}{demo1.dat}
2 \pstScalePoints(1,0.000001){}% (x,y){additional x operator}{y op}
3 \psset{llx=-1cm, lly=-1cm}
4 \psgraph[ylabelFactor={\cdot 10^6}, Dx=5, Dy=100](0,0)(25,750){8cm}{5cm}
5   \listplot[linecolor=red, linewidth=2pt, showpoints=true]{\data}
6 \endpsgraph
7 \pstScalePoints(1,1){}% reset

```

19.18 Plot style bar and option barwidth

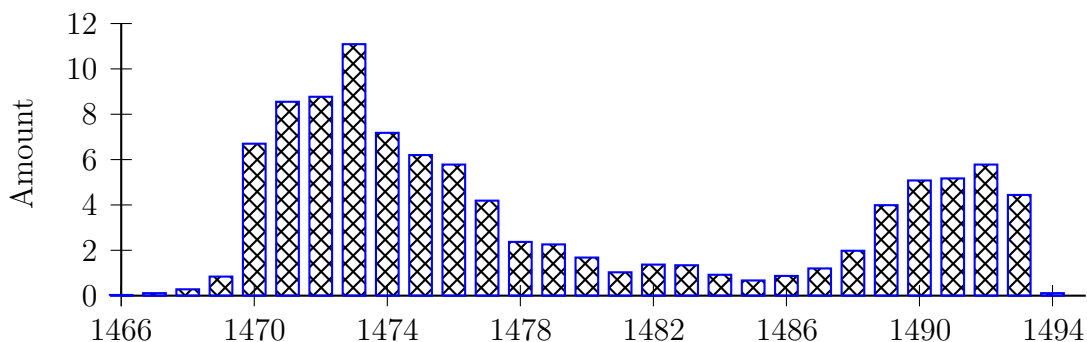
This option allows to draw bars for the data records. The width of the bars is controlled by the option `barwidth`, which is set by default to value of 0.25cm, which is the total width.



```

1 \psset{xunit=.44cm,yunit=.3cm}
2 \begin{pspicture}(-2,-1.5)(29,13)
3   \psaxes[axesstyle=axes,0x=1466,0y=0,Dx=4,Dy=2,%
4     ylabelFactor={\,%}](-3,12)
5   \listplot[shadow=true,linecolor=blue,plotstyle=bar,barwidth=0.3cm,
6     fillcolor=red,fillstyle=solid]{\barData}
7   \rput{90}(-3,6.25){Amount}
8 \end{pspicture}

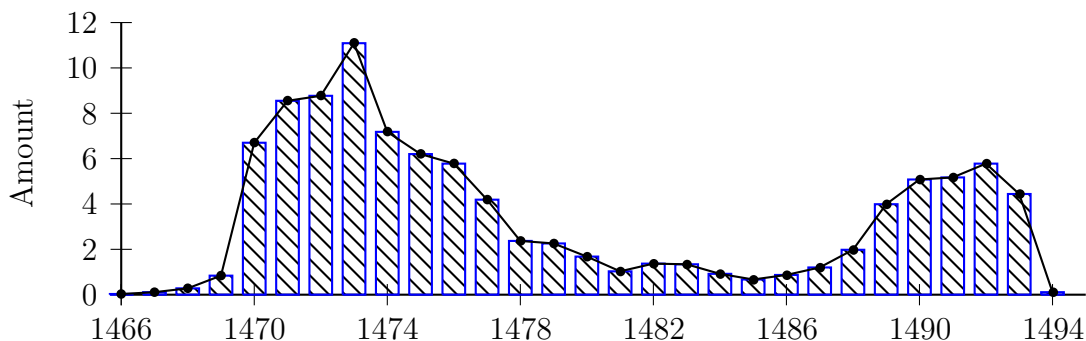
```



```

1 \psset{xunit=.44cm,yunit=.3cm}
2 \begin{pspicture}(-2,-1.5)(29,13)
3   \psaxes[axesstyle=axes,0x=1466,0y=0,Dx=4,Dy=2,%
4     ylabelFactor={\,%}}{-}(29,12)
5   \listplot[linecolor=blue,plotstyle=bar,barwidth=0.3cm,
6     fillcolor=red,fillstyle=crosshatch]{\barData}
7   \rput{90}(-3,6.25){Amount}
8 \end{pspicture}

```



```

1 \psset{xunit=.44cm,yunit=.3cm}
2 \begin{pspicture}(-2,-1.5)(29,13)
3   \psaxes[axesstyle=axes,0x=1466,0y=0,Dx=4,Dy=2,%
4     ylabelFactor={\,%}}{-}(29,12)
5   \listplot[linecolor=blue,plotstyle=bar,barwidth=0.3cm,
6     fillcolor=red,fillstyle=vlines]{\barData}
7   \listplot[showpoints=true]{\barData}
8   \rput{90}(-3,6.25){Amount}
9 \end{pspicture}

```

19.19 New options for \readdata

By default the macros `\readdata` reads every data record, which could be annoying when there are more than 10000 records to read. The package `pst-plot-add` defines an additional key `nStep`, which allows to read only a selected part of the data records, e.g. `nStep=10`, only every 10th records is saved.

```

1 \readdata[nStep=10]{\dataA}{stressrawdata.dat}

```

The default value for `nStep` is 1.

20 New options for \listplot

By default the plot macros `\dataplot`, `\fileplot` and `\listplot` plot every data record. The package `pst-plot-add` defines additional keys `nStep`, `nStart`, `nEnd` and `xStep`, `xStart`, `xEnd`, which allows to plot only a selected part of the data records, e.g. `nStep=10`. These "n" options

mark the number of the record to be plot (0, 1, 2, ...) and the "x" ones the x-values of the data records.

Name	Default setting
<code>nStart</code>	1
<code>nEnd</code>	{}
<code>nStep</code>	1
<code>xStart</code>	{}
<code>xEnd</code>	{}
<code>yStart</code>	{}
<code>yEnd</code>	{}
<code>xStep</code>	0
<code>plotNo</code>	1
<code>plotNoMax</code>	1

These new options are only available for the `\listplot` macro, which is not a real limitation, because all data records can be read from a file with the `\readdata` macro (see example files or [\[3\]](#)):

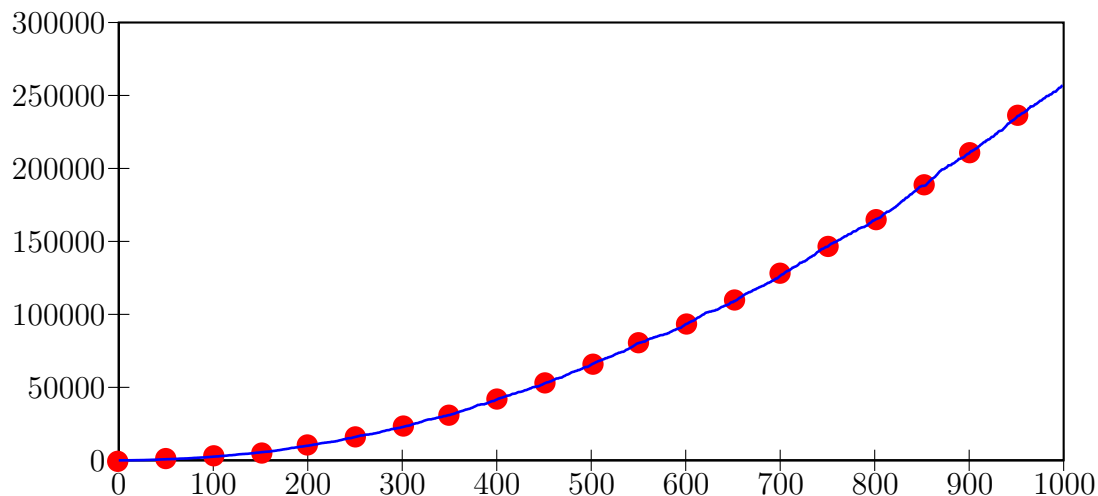
```
\readdata[nStep=10]{\data}{/home/voss/data/data1.dat}
```

The use `nStep` and `xStep` options make only real sense when also using the option `plotstyle=dots`. Otherwise the coordinates are connected by a line as usual. Also the `xStep` option needs increasing x values. Pay attention that `nStep` can be used for `\readdata` and for `\listplot`. If used in both macros than the effect is multiplied, e.g. `\readdata` with `nStep=5` and `\listplot` with `nStep=10` means, that only every 50th data records is read and plotted.

When both, `x/yStart/End` are defined then the values are also compared with both values.

20.1 Example for nStep/xStep

The datafile `data.dat` contains 1000 data records. The thin blue line is the plot of all records with the `plotstyle` option `curve`.

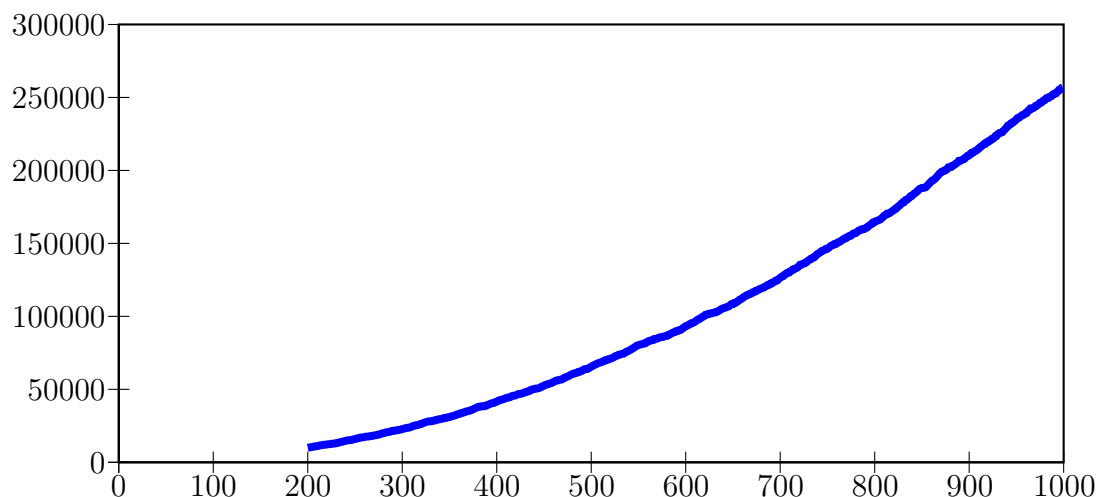


```

1 \readdata{\data}{examples/data.dat}
2 \psset{xunit=0.125mm,yunit=0.0002mm}
3 \begin{pspicture}(-80,-30000)(1000,310000)
4 \psaxes[axesstyle=frame,Dx=100,dx=100,Dy=50000,dy=50000](1000,300000)
5 \listplot[nStep=50,linewidth=3pt,linecolor=red,plotstyle=dots]{\data}
6 \listplot[linewidth=1pt,linecolor=blue]{\data}
7 \end{pspicture}

```

20.2 Example for nStart/xStart

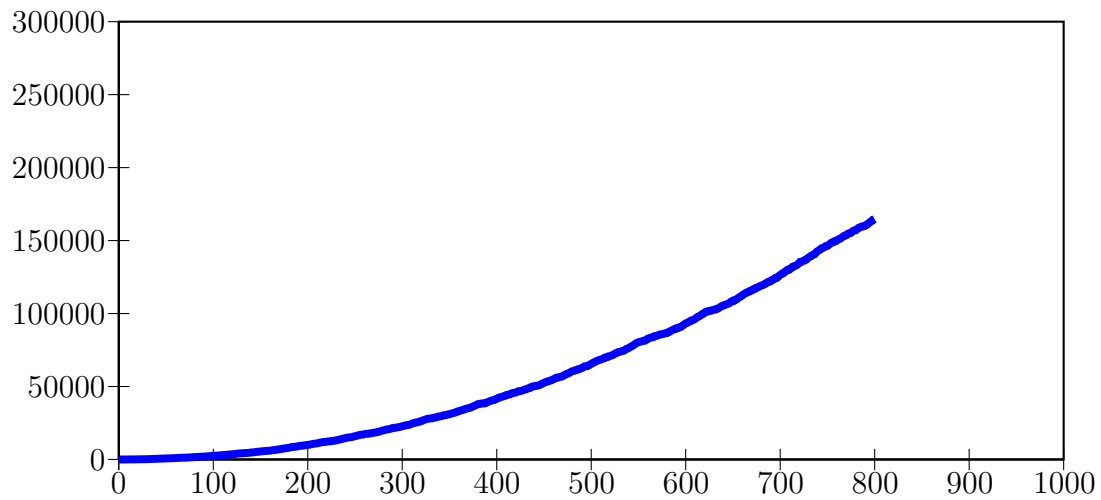


```

1 \readdata{\data}{examples/data.dat}
2 \psset{xunit=0.125mm,yunit=0.0002mm}
3 \begin{pspicture}(-80,-30000)(1000,310000)
4 \psaxes[axesstyle=frame,Dx=100,dx=100,Dy=50000,dy=50000](1000,300000)
5 \listplot[nStart=200,linewidth=3pt,linecolor=blue]{\data}
6 \end{pspicture}

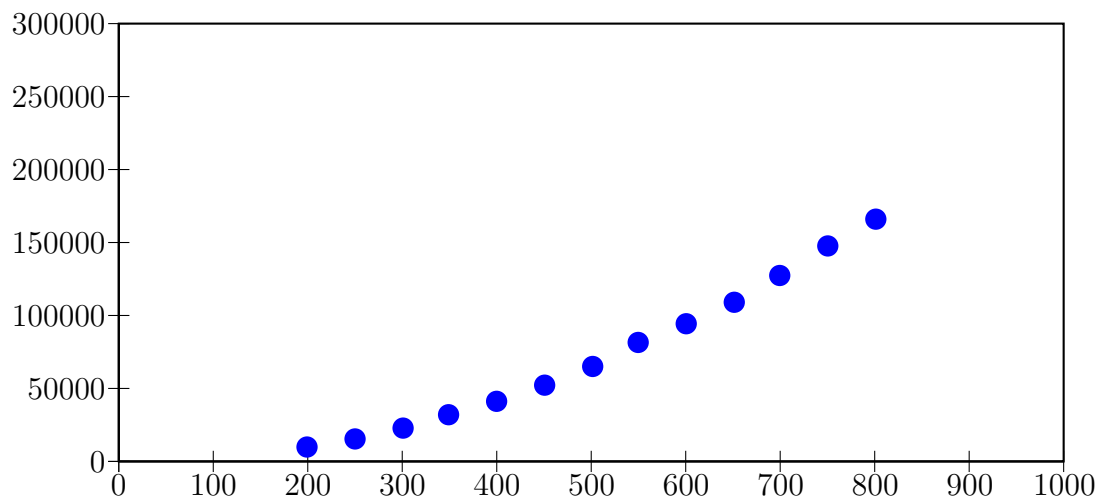
```

20.3 Example for nEnd/xEnd



```
1 \readdata{\data}{examples/data.dat}
2 \psset{xunit=0.125mm,yunit=0.0002mm}
3 \begin{pspicture}(-80,-30000)(1000,310000)
4 \psaxes[axesstyle=frame,Dx=100,dx=100,Dy=50000,dy=50000](1000,300000)
5 \listplot[nEnd=800,linewidth=3pt,linecolor=blue]{\data}
6 \end{pspicture}
```

20.4 Example for all new options



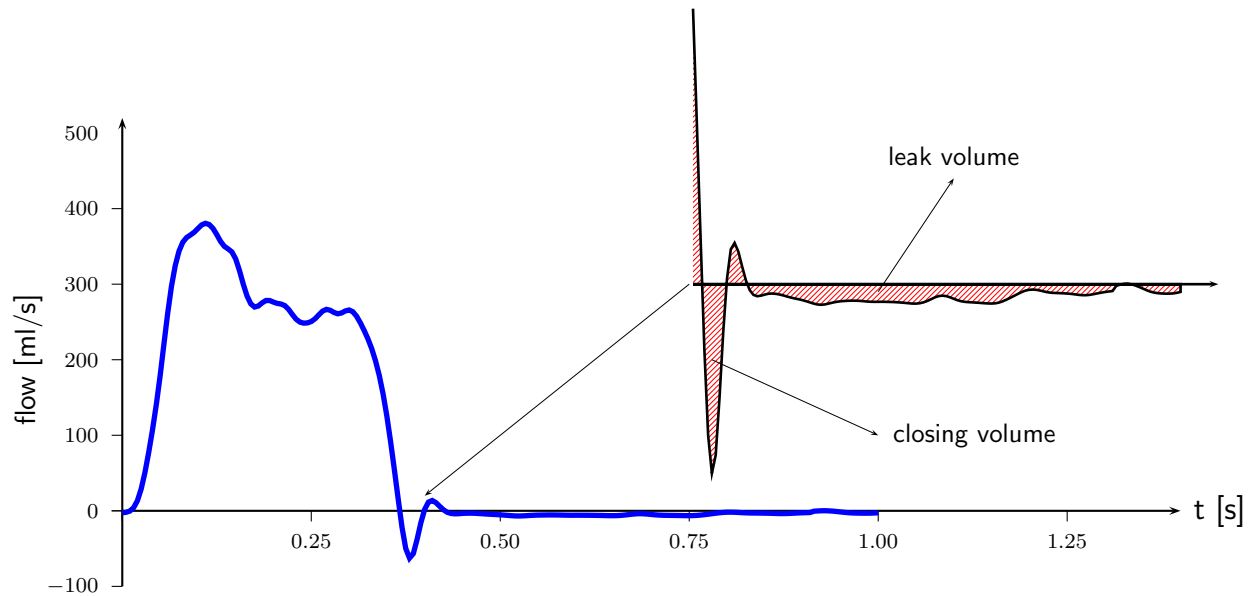
```

1 \readdata{\data}{examples/data.dat}
2 \psset{xunit=0.125mm,yunit=0.0002mm}
3 \begin{pspicture}(-80,-30000)(1000,310000)
4 \psaxes[axesstyle=frame,Dx=100,dx=100,Dy=50000,dy=50000](1000,300000)
5 \listplot[nStart=200,nEnd=800,nStep=50,linewidth=3pt,linecolor=blue,%
6 plotstyle=dots]{\data}
7 \end{pspicture}

```

20.5 Example for xStart

This example shows the use of the same plot with different units and different `xStart` value. The blue curve is the original plot of the data records. To show the important part of the curve there is another one plotted with a greater `yunit` and a start value of `xStart=0.35`. This makes it possible to have a kind of a zoom to the original graphic.

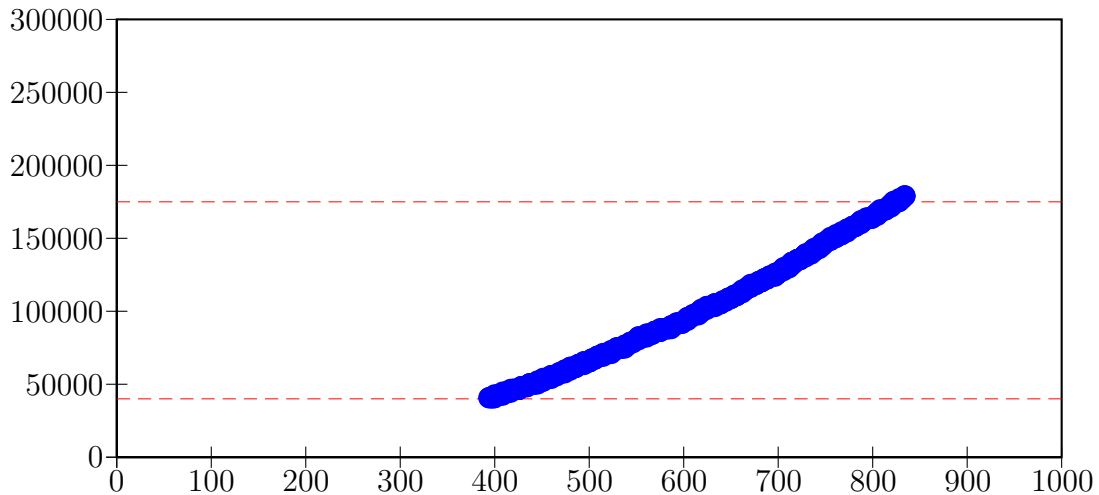


```

1 \psset{xunit=10cm, yunit=0.01cm,xLabel={\scriptsize\sffamily},yLabel={\scriptsize\sffamily}}
2 \readdata{\data}{examples/data3.dat}
3 \begin{pspicture}(-0.1,-100)(1.5,700.0)
4   \psaxes[Dx=0.25,Dy=100,dy=100\psyunit,tickstyle=bottom]{->}(0,0)(0,-100)(1.4,520)
5   \uput[0](1.4,0){\textsf{t [s]}}
6   \rput(-0.125,200){\rotateleft{\small\sffamily flow [ml/s]}}
7   \listplot[linewidth=2pt, linecolor=blue]{\data}
8   \rput(0.4,300){
9     \pscustom[yunit=0.04cm, linewidth=1pt]{%
10      \listplot[xStart=0.355]{\data}
11      \psline(1,-2.57)(1,0)(0.355,0)
12      \fill[fillstyle=hlines,fillcolor=gray,hatchwidth=0.4pt,hatchsep=1.5pt,hatchcolor=red]%
13      \psline[linewidth=0.5pt]{->}(0.7,0)(1.05,0)
14    }%
15  }
16  \psline[linewidth=.01]{->}(0.75,300)(0.4,20)
17  \psline[linewidth=.01]{->}(1,290)(1.1,440)
18  \rput(1.1,470){\footnotesize\sffamily leak volume}
19  \psline[linewidth=.01]{->}(0.78,200)(1,100)
20  \rput[1](1.02,100){\footnotesize\sffamily closing volume}
21 \end{pspicture}

```

20.6 Example for yStart/yEnd



```

1 \readdata{\data}{examples/data.dat}
2 \psset{xunit=0.125mm,yunit=0.0002mm}
3 \begin{pspicture}(-80,-30000)(1000,310000)
4   \psaxes[axesstyle=frame,Dx=100,dx=100,Dy=50000,dy=50000](1000,300000)
5   \psset{linewidth=0.1pt,linestyle=dashed,linecolor=red}
6   \psline(0,40000)(1000,40000)
7   \psline(0,175000)(1000,175000)
8   \listplot[yStart=40000,yEnd=175000,linewidth=3pt,linecolor=blue,
9     plotstyle=dots]{\data}
10 \end{pspicture}

```

20.7 Example for plotNo/plotNoMax

By default the plot macros expect $x|y$ data records, but when having data files with multiple values for y , like:

```

x y1 y2 y3 y4 ... yMax
x y1 y2 y3 y4 ... yMax
...

```

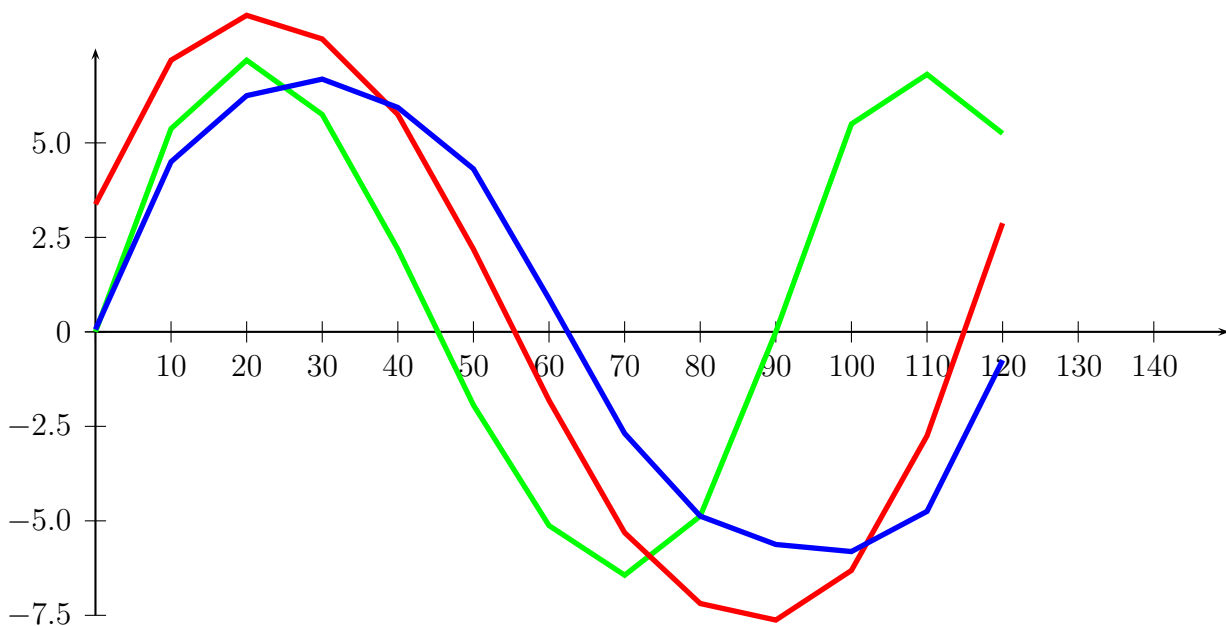
you can select the y value which should be plotted. The option `plotNo` marks the plotted value (default 1) and the option `plotNoMax` tells `pst-plot` how many y values are present. There are no real restrictions in the maximum number for `plotNoMax`.

We have the following data file:

```

[% file examples/data.dat
0    0    3.375    0.0625
10   5.375    7.1875    4.5
20   7.1875    8.375    6.25
30   5.75     7.75     6.6875
40   2.1875    5.75     5.9375
50  -1.9375    2.1875    4.3125
60  -5.125    -1.8125    0.875
70  -6.4375   -5.3125   -2.6875
80  -4.875    -7.1875   -4.875
90   0     -7.625    -5.625
100   5.5     -6.3125   -5.8125
110   6.8125   -2.75    -4.75
120   5.25     2.875    -0.75
]%
```

which holds data records for multiple plots (x y_1 y_2 y_3). This can be plotted without any modification to the data file:



```

1 \readdata\Data{examples/dataMul.dat}
2 \psset{xunit=0.1cm, yunit=0.5cm}
3 \begin{pspicture}(0,-7.5)(150,10)
4 \psaxes[Dx=10,Dy=2.5]{->}(0,0)(0,-7.5)(150,7.5)
5 \psset{linewidth=2pt,plotstyle=line}
6 \listplot[linecolor=green,plotNo=1,plotNoMax=3]{\Data}
7 \listplot[linecolor=red,plotNo=2,plotNoMax=3]{\Data}
8 \listplot[linecolor=blue,plotNo=3,plotNoMax=3]{\Data}
9 \end{pspicture}

```

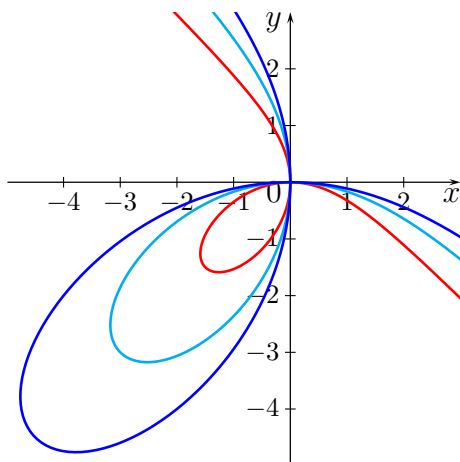
21 Polar plots

With the option `polarplot=false|true` it is possible to use `\psplot` in polar mode:

```
\psplot[polarplot=true,...]{<start angle>}{<end angle>}{<r(alpha)>}
```

The equation in PostScript code is interpreted as a function $r = f(\alpha)$, e.g. for the circle with radius 1 as $r = \sqrt{\sin^2 x + \cos^2 x}$:

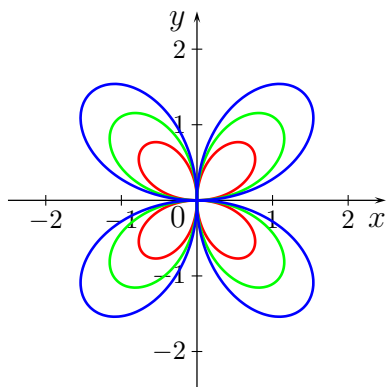
```
x sin dup mul x cos dup mul add sqrt
```



```

1 \resetOptions
2 \psset{plotpoints=200,unit=0.75}
3 \begin{pspicture}*(-5,-5)(3,3)
4   \psaxes[labelsep=.75mm,xyLabel=\
      footnotesize,
5     arrowlength=1.75,ticks=2pt,%
6     linewidth=0.17mm]{->}(0,0)(-4.99,-4.99)
7     (3,3)
8   \rput[Br](3,-.35){$x$}
9   \rput[tr](-.15,3){$y$}
10  \rput[Br](-.15,-.35){$0$}
11  \psset{linewidth=.35mm,polarplot=true}
12  \psplot[linecolor=red]{140}{310}{3 neg x
    sin mul x cos mul x sin 3 exp x cos 3
    exp add div}
13  \psplot[linecolor=cyan]{140}{310}{6 neg x
    sin mul x cos mul x sin 3 exp x cos 3
    exp add div}
14  \psplot[linecolor=blue]{140}{310}{9 neg x
    sin mul x cos mul x sin 3 exp x cos 3
    exp add div}
15 \end{pspicture}

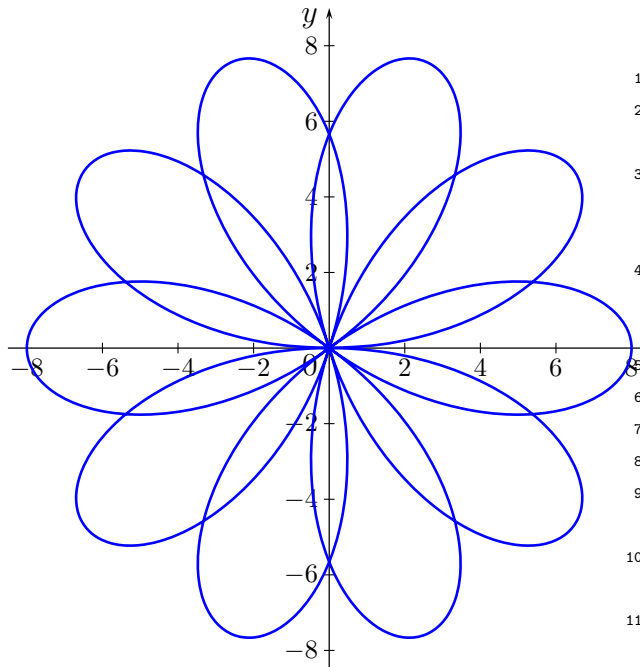
```



```

1 \resetOptions
2 \psset{plotpoints=200,unit=1}
3 \begin{pspicture}(-2.5,-2.5)(2.5,2.5)% Ulrich
4   \psaxes[labelsep=.75mm,xyLabel=\footnotesize,%
5     arrowlength=1.75,ticks=2pt,linewidth=0.17
6     mm]{->}(0,0)(-2.5,-2.5)(2.5,2.5)
7   \rput[Br](2.5,-.35){$x$}
8   \rput[tr](-.15,2.5){$y$}
9   \rput[Br](-.15,-.35){$0$}
10  \psset{linewidth=.35mm,plotstyle=curve,
11    polarplot=true}
12  \psplot[linecolor=red]{0}{360}{x cos 2 mul x
13    sin mul}
14  \psplot[linecolor=green]{0}{360}{x cos 3 mul x
15    sin mul}
16  \psplot[linecolor=blue]{0}{360}{x cos 4 mul x
17    sin mul}
18 \end{pspicture}

```



```

1 \psset{plotpoints=200,unit=0.5}
2 \begin{pspicture}(-8.5,-8.5)(9,9) %
   Ulrich Dirr
3 \psaxes[Dx=2,dx=2,Dy=2,dy=2,
   labelsep=.75mm,xyLabel=\
   footnotesize,%
4   arrowlength=1.75,ticksiz=2pt,
   linewidth=0.17mm]{->}(0,0)
   (-8.5,-8.5)(9,9)
5 \rput[Br](9,-.7){$x$}
6 \rput[tr](-.3,9){$y$}
7 \rput[Br](-.3,-.7){$0$}
8 %
9 \psset{linewidth=.35mm,plotstyle=
   curve,polarplot=true}
10 \psplot[linecolor=blue
   ]{0}{720}{8 2.5 x mul sin mul}
11 \end{pspicture}

```

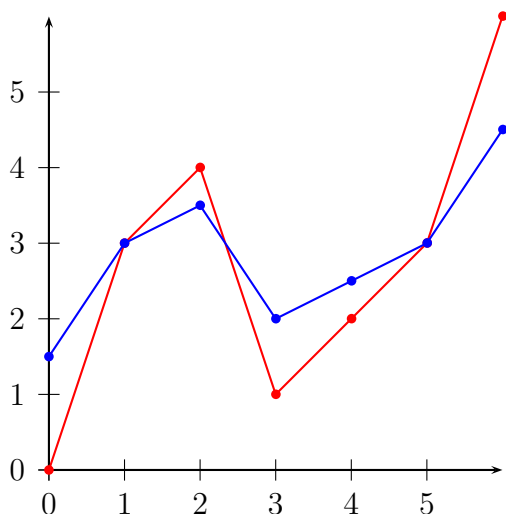
22 New commands and environments

22.1 \pstScalePoints

The syntax is

`\pstScalePoints(xScale,yScale){xPS}{yPS}`

`xScale,yScale` are decimal values as scaling factors, the `xPS` and `yPS` are additional PostScript code to the `x`- and `y`-values of the data records. This macro is only valid for the `\listplot` macro!



```

1 \def\data{0 0
2 1 3
3 2 4
4 3 1
5 4 2
6 5 3
7 6 6}
8 \begin{pspicture}(6,6)
9 \psaxes{->}(6,6)
10 \listplot[showpoints=true,linecolor=red]{\
   data}
11 \pstScalePoints(1,0.5){}{3 add}
12 \listplot[showpoints=true,linecolor=blue]{\
   data}
13 \end{pspicture}

```


Changes with `\pstScalePoints` are always global to all following `\listplot` macros. This is the reason why it is a good idea to reset the values at the end of the `pspicture` environment.

```
\pstScalePoints(1,1){}{}
```

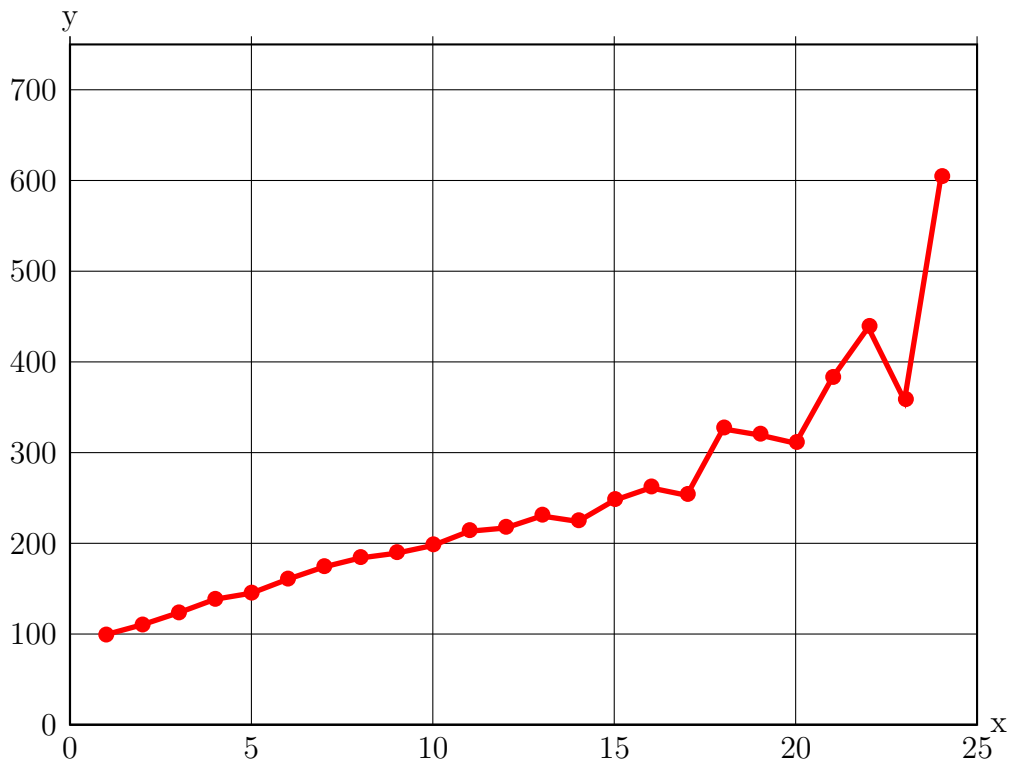
22.2 psgraph environment

This new environment does the scaling, it expects as parameter the values (without units!) for the coordinate system and the values of the physical width and height (with units!). The syntax is:

```
\psgraph[<options>] (xMin,yMin) (xMax,yMax){xLength}{yLength}
...
\endpsgraph

\begin{psgraph}[<options>] (xMin,yMin) (xMax,yMax){xLength}{yLength}
...
\end{psgraph}
```

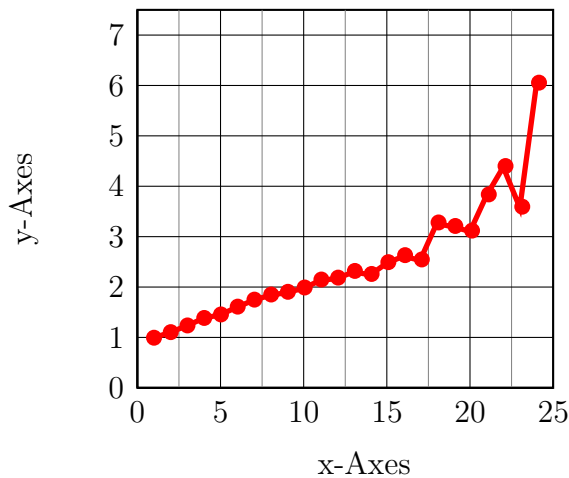
where the options are valid only for the `\psaxes` macro.



```

1 \readdata{\data}{demo1.dat}
2 \pstScalePoints(1,0.000001){}{% (x,y){additional x operator}{y op}
3 \psset{llx=-0.5cm,lly=-1cm}
4 \psgraph[axesstyle=frame,xticks=0 759,yticks=0 25,%
5     subticks=0,ylabelFactor={\cdot 10^6},%
6     Dx=5,dy=100\psyunit,Dy=100](0,0)(25,750){12cm}{9cm}
7     \listplot[linecolor=red,linewidth=2pt,showpoints=true]{\data}
8 \endpsgraph

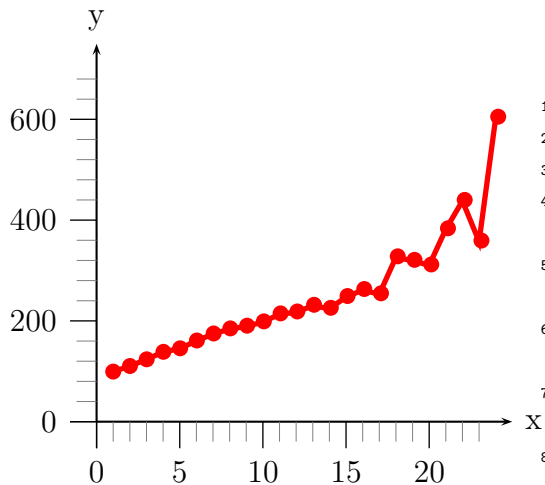
```



```

1 \readdata{\data}{demo1.dat}
2 \psset{xAxisLabel=x-Axes,yAxisLabel=y-
3     Axes,llx=-1cm,%
4     xAxisLabelPos={3cm,-1cm},
5     yAxisLabelPos={-1.5cm,2.5cm}}
6 \pstScalePoints(1,0.00000001){}{%
7 \begin{psgraph}[axesstyle=frame,
8     xticks=0 7.5,yticks=0 25,
9     subticks=1,%
10    ylabelFactor={\cdot 10^8},Dx=5,Dy
11    =1,xsubticks=2](0,0)(25,7.5){5.5cm}{5cm}
12 \listplot[linecolor=red,linewidth=2pt,
13     showpoints=true]{\data}
14 \end{psgraph}

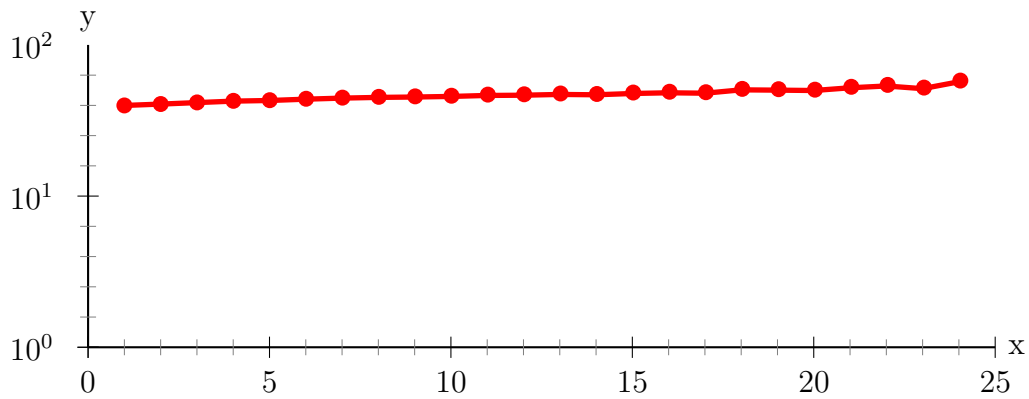
```



```

1 \readdata{\data}{demo1.dat}
2 \psset{llx=-0.5cm,lly=-1cm}
3 \pstScalePoints(1,0.000001){}{%
4 \psgraph[arrows=->,Dx=5,dy=200\psyunit,Dy
5     =200,%
6     subticks=5,ticks=-10pt 0,tickwidth
7     =0.5pt,%
8     subtickwidth=0.1pt](0,0)(25,750){5.5cm}{5cm}
9 \listplot[linecolor=red,linewidth=2pt,
10     showpoints=true,]{\data}
11 \endpsgraph

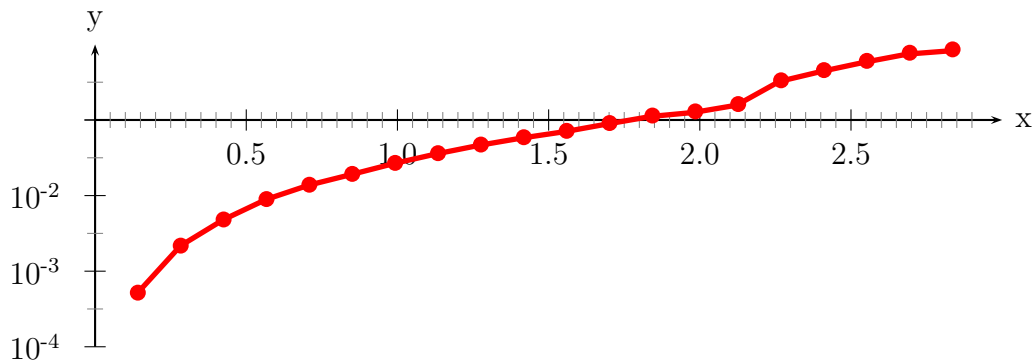
```



```

1 \pstScalePoints(1,0.2){}{log}
2 \psset{lly=-0.75cm}
3 \psgraph[ylogBase=10,Dx=5,Dy=1,subticks=5](0,0)(25,2){12cm}{4cm}
4   \listplot[linecolor=red,linewidth=2pt,showpoints=true]{\data}
5 \endpsgraph

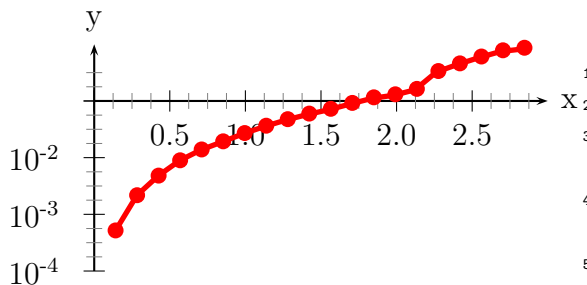
```



```

1 \readdata{\data}{demo0.dat}
2 \pstScalePoints(1,1){}{log}
3 \begin{psgraph}[arrows=->,Dx=0.5,ylogBase=10,Oy=-1,xsubticks=10,%
4   ysubticks=2](0,-3)(3,1){12cm}{4cm}
5   \listplot[linecolor=red,linewidth=2pt,showpoints=true]{\data}
6 \end{psgraph}

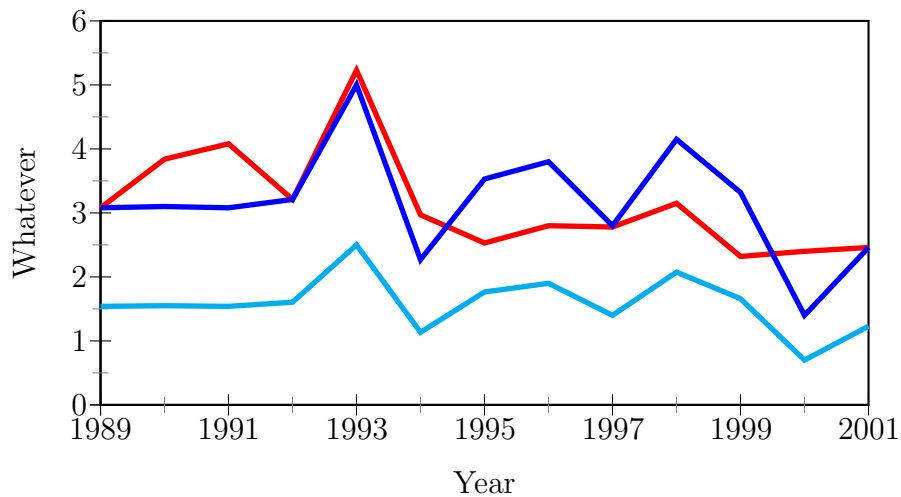
```



```

1 \readdata{\data}{demo0.dat}
2 \pstScalePoints(1,1){}{log}
3 \psgraph[arrows=->,Dx=0.5,ylogBase=10,Oy=-1,subticks=4](0,-3)(3,1){6cm}{3cm}
4   \listplot[linecolor=red,linewidth=2pt,showpoints=true]{\data}
5 \endpsgraph

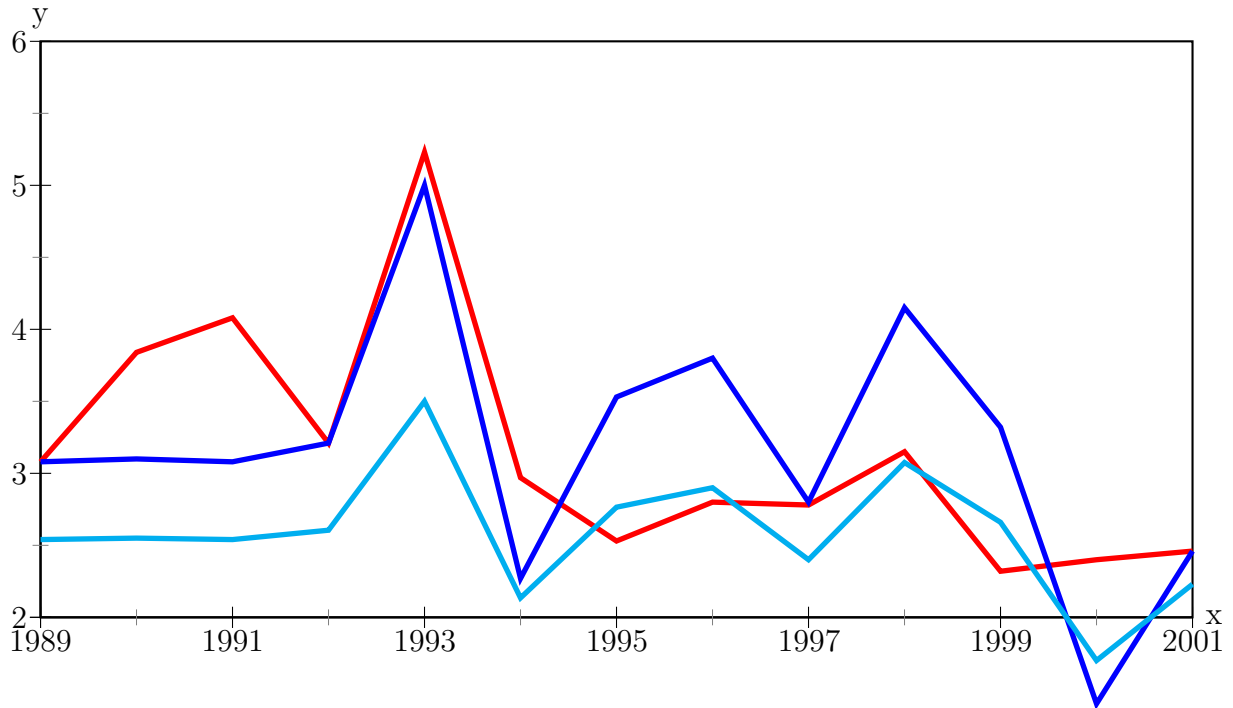
```



```

1 \readdata{\data}{demo2.dat}%
2 \readdata{\dataII}{demo3.dat}%
3 \pstScalePoints(1,1){1989 sub}{}
4 \psset{llx=-0.5cm, lly=-1cm, xAxisLabel=Year, yAxisLabel=Whatever, %
5     xAxisLabelPos={2in, -0.4in}, yAxisLabelPos={-0.4in, 1in}}
6 \psgraph[axesstyle=frame, Dx=2, Ox=1989, subticks=2](0,0)(12,6){4in}{2in}%
7     \listplot[linecolor=red, linewidth=2pt]{\data}
8     \listplot[linecolor=blue, linewidth=2pt]{\dataII}
9     \listplot[linecolor=cyan, linewidth=2pt, yunit=0.5]{\dataII}
10 \endpsgraph

```

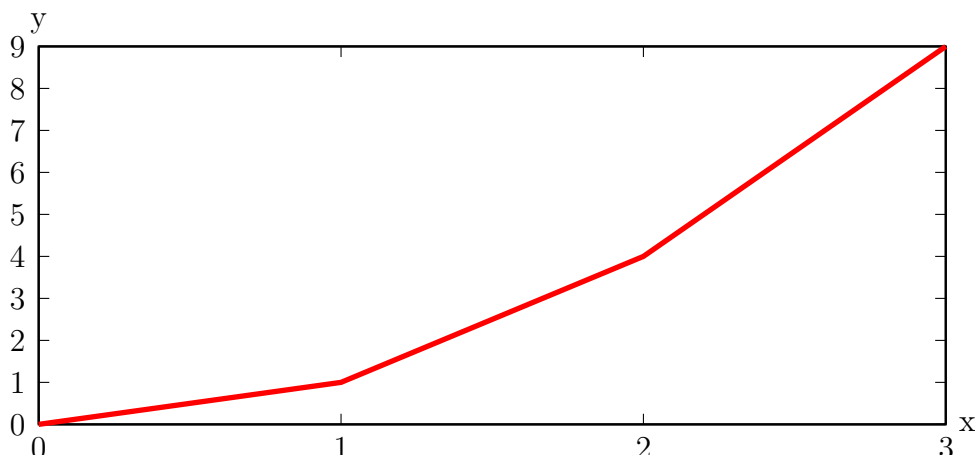


```

1 \psset{llx=-0.5cm,lly=-0.75cm}
2 \pstScalePoints(1,1){1989 sub}{2 sub}
3 \begin{psgraph}[axesstyle=frame,Dx=2,Ox=1989,Oy=2,subticks=2](0,0)(12,4){6
  in}{3in}%
4   \listplot[linecolor=red,linewidth=2pt]{\data}
5   \listplot[linecolor=blue,linewidth=2pt]{\dataII}
6   \listplot[linecolor=cyan,linewidth=2pt,yunit=0.5]{\dataII}
7 \end{psgraph}

```

An example with ticks on every side of the frame:



```

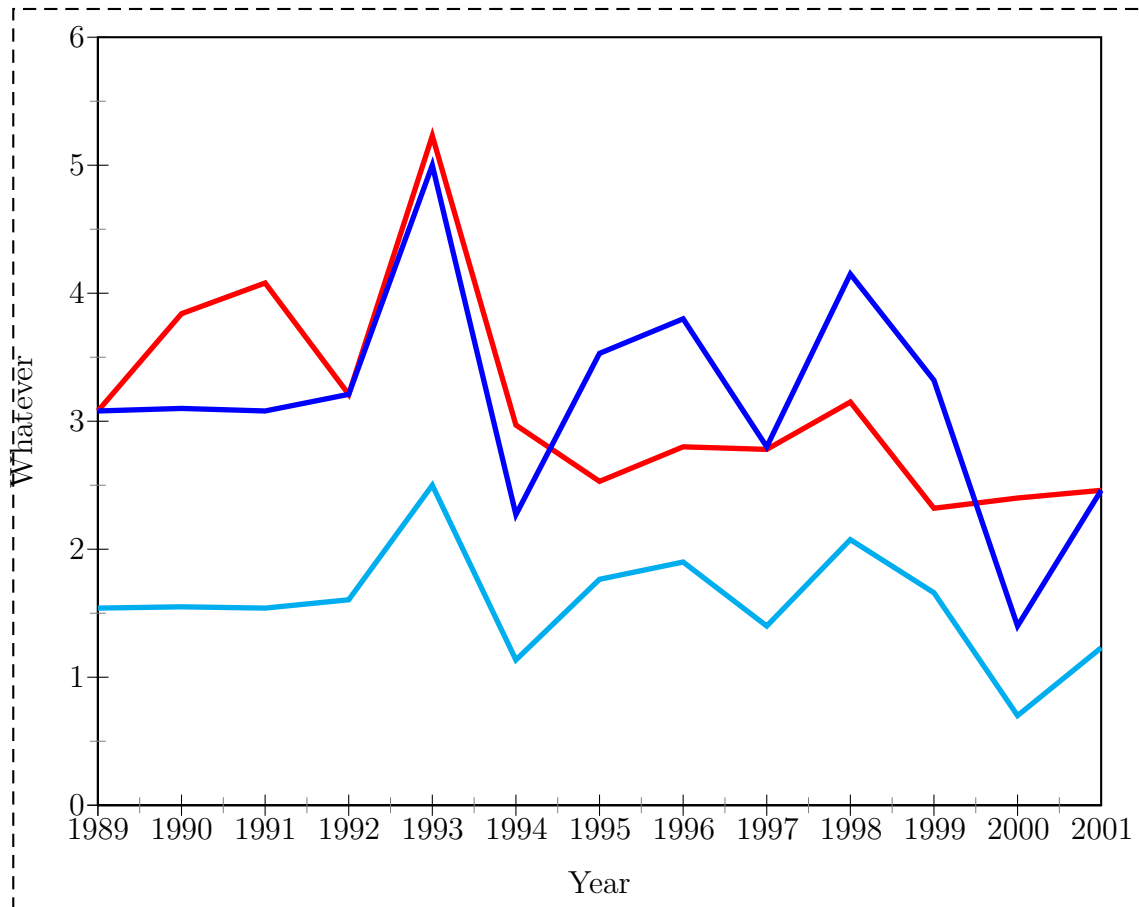
1 \def\data{0 0 1 1 2 4 3 9}
2 \begin{psgraph}[axesstyle=frame,tickstyle=top](0,0)(3.0,9.0){12cm}{5cm}
3   \psaxes[axesstyle=frame,labels=none,tickstyle=bottom](3,9)(0,0)(3,9)
4   \listplot[linecolor=red,linewidth=2pt]{\data}
5 \end{psgraph}

```

22.2.1 The new options

name	default	meaning
xAxisLabel	x	label for the x-axis
yAxisLabel	y	label for the y-axis
xAxisLabelPos	{}	where to put the x-label
yAxisLabelPos	{}	where to put the y-label
llx	0pt	trim for the lower left x
lly	0pt	trim for the lower left y
urx	0pt	trim for the upper right x
ury	0pt	trim for the upper right y

There is one restriction in using the trim parameters, they must be set **before** `psgraph` is called. They are senseless, when using as parameters of `psgraph` itself.



```

1 \psset{llx=-1cm,lly=-1.25cm,urx=0.5cm,ury=0.1in,xAxisLabel=Year,%
2   yAxisLabel=Whatever,xAxisLabelPos={.4\linewidth,-0.4in},%
3   yAxisLabelPos={-0.4in,2in}}
4 \pstScalePoints(1,1){1989 sub}{}
5 \psframebox[linestyle=dashed,boxsep=0pt]{%
6 \begin{psgraph}[axesstyle=frame,0x=1989,subticks=2](0,0)(12,6){0.8\
   \linewidth}{4in}%
7   \listplot[linecolor=red,linewidth=2pt]{\data}%
8   \listplot[linecolor=blue,linewidth=2pt]{\dataII}%
9   \listplot[linecolor=cyan,linewidth=2pt,yunit=0.5]{\dataII}%
10 \end{psgraph}%
11 }

```

22.3 \resetOptions

Sometimes it is difficult to know what options which are changed inside a long document are different to the default one. With this macro all options depending to `pst-plot` can be reset. This depends to all options of the packages `pstricks`, `pst-plot` and `pst-node`.

23 Credits

Hendri Adriaans | Ulrich Dirr | Hubert Gäblein | Denis Girou | Peter Hutnick | Christophe Jorssen | Manuel Luque | Jens-Uwe Morawski | Tobias Nähring | Rolf Niepraschk | Dominique Rodriguez | Timothy Van Zandt

References

- [1] Denis Girou. Présentation de PSTricks. *Cahier GUTenberg*, 16:21–70, April 1994.
- [2] Michel Goossens, Frank Mittelbach, and Alexander Samarin. *The L^AT_EX Graphics Companion*. Addison-Wesley Publishing Company, Reading, Mass., 1997.
- [3] Laura E. Jackson and Herbert Voß. Die plot-funktionen von `pst-plot`. *Die T_EXnische Komödie*, 2/02:27–34, June 2002.
- [4] Nikolai G. Kollock. *PostScript richtig eingesetzt: vom Konzept zum praktischen Einsatz*. IWT, Vaterstetten, 1989.
- [5] Herbert Voß. *Chaos und Fraktale selbst programmieren: von Mandelbrotmengen über Farbmanipulationen zur perfekten Darstellung*. Franzis Verlag, Poing, 1994.
- [6] Herbert Voß. Die mathematischen Funktionen von PostScript. *Die T_EXnische Komödie*, 1/02, March 2002.
- [7] Timothy van Zandt. *PSTricks - PostScript macros for generic T_EX*. <http://www.tug.org/application/PSTricks>, 1993.
- [8] Timothy van Zandt. *multido.tex - a loop macro, that supports fixed-point addition*. CTAN:/graphics/pstricks/generic/multido.tex, 1997.
- [9] Timothy van Zandt. *pst-plot: Plotting two dimensional functions and data*. CTAN:/graphics/pstricks/generic/pst-plot.tex, 1999.
- [10] Timothy van Zandt and Denis Girou. Inside PSTricks. *TUGboat*, 15:239–246, September 1994.

24 Change log

See file Changes