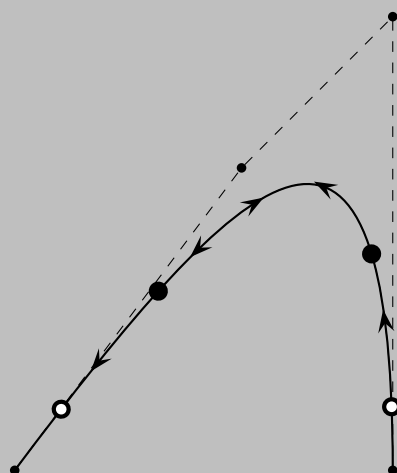


# PSTricks

## pst-arrow

A PSTricks package for drawing arrows; v.0.04

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The pstricks related package provides more arrow types.

## 1 Arrows

pstricks 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.
H - H		left/right hook arrows.
v - v		left/right inside vee arrows.
V - V		left/right outside vee arrows.
f - f		left/right inside filled arrows.
F - F		left/right outside filled arrows.
t - t		left/right inside slash arrows.

T-T		left/right outside slash arrows.
<D-D>		curved arrows.
<D<D-D>D>		curved doubled arrows.
D>-<D		curved arrows, tip inside.
<T-T>		curved lines.

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,tipcolor=blue,linewidth=2pt]{|->}(0,0)(0,2)
```



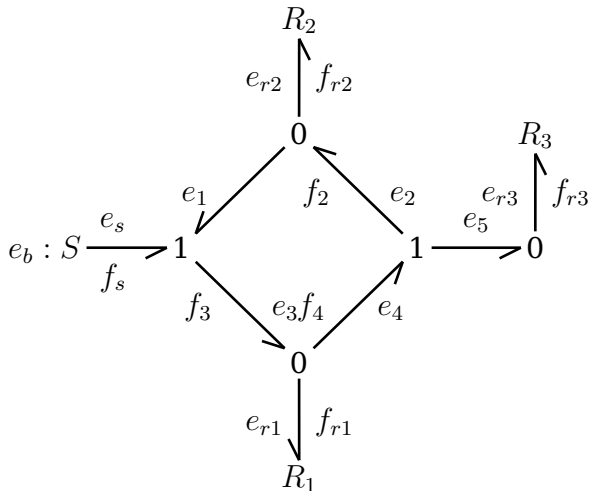
## 1.1 Multiple arrows

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

## 1.2 hookarrow



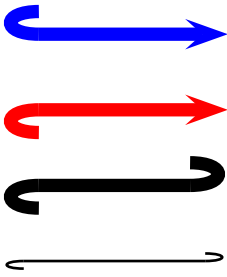
```
\psset{arrowsize=8pt,arrowlength=1,linewidth=1pt,nodesep=2pt,shortput=tablr}
\large
\begin{psmatrix}[colsep=12mm,rowsep=10mm]
    & & $R_2$ & & \\
    & & 0 & & $R_3$ \\
    $e_b:S$ & 1 & & 1 & 0 \\
    & & 0 & & \\
    & & $R_1$ & & \\
\end{psmatrix}
\ncline{-h-}{1,3}{2,3}<{$e_{r2}$}>{$f_{r2}$}\ncline{-h-}{2,3}{3,2}<{$e_1$}
\ncline{-h-}{3,1}{3,2}^{$e_s$}_{$f_s$}\ncline{-h-}{3,2}{4,3}>{$e_3$}<{$f_3$}
\ncline{-h-}{4,3}{3,4}>{$e_4$}<{$f_4$}\ncline{-h-}{3,4}{2,3}>{$e_2$}<{$f_2$}
\ncline{-h-}{3,4}{3,5}^{$e_5$}
\ncline{-h-}{3,5}{2,5}<{$e_{r3}$}>{$f_{r3}$}
\ncline{-h-}{4,3}{5,3}<{$e_{r1}$}>{$f_{r1}$}
```

## 1.3 hookrightarrow and hookleftarrow

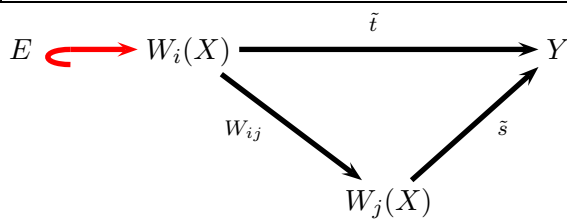
This is another type of arrow and is abbreviated with H. The length and width of the hook is set by the new options `hooklength` and `hookwidth`, which are by default set to

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

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



```
\begin{pspicture}(3,4)
\psline[linewidth=5pt,linecolor=blue,hooklength=5mm,hookwidth=-3mm]{H->}(0,3.5)(3,3.5)
\psline[linewidth=5pt,linecolor=red,hooklength=5mm,hookwidth=3mm]{H->}(0,2.5)(3,2.5)
\psline[linewidth=5pt,hooklength=5mm,hookwidth=3mm]{H-H}(0,1.5)(3,1.5)
\psline[linewidth=1pt]{H-H}(0,0.5)(3,0.5)
\end{pspicture}
```










```
$\begin{psmatrix}
E&W_i(X)&&Y\\
&&&&\\
&&W_j(X)&&
\psset{arrows=->,nodesep=3pt,linewidth=2pt}
\everypsbox{\scriptstyle}
\ncline[linecolor=red,arrows=H->,%
hooklength=4mm,hookwidth=2mm]{1,1}{1,2}
\ncline{1,2}{1,4}^{\tilde{t}}
\ncline{1,2}{2,3}<{W_{ij}}
\ncline{2,3}{1,4}>{\tilde{s}}
\end{psmatrix}$
```

## 1.4 ArrowInside Option

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

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

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

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.

The `ArrowInside` takes only arrow definitions like `->` into account. Arrows from right to left (`<-`) are not possible and ignored. If you need such arrows, change the order of the pairs of coordinates for the line or curve macro.

### 1.5 ArrowFill option

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



```
\psline[arrowscale=2.5,linecolor=red,arrowinset=0]{<->}(-1,0)(2,0)
```



```
\psline[arrowscale=2.5,linecolor=red,arrowinset=0,ArrowFill=false]{<->}(-1,0)(2,0)
```



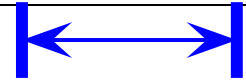
```
\psline[arrowscale=2.5,linecolor=red,arrowinset=0,arrowsize=0.2,  
ArrowFill=false]{<->}(-1,0)(2,0)
```



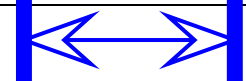
```
\psline[arrowscale=2.5,linecolor=blue,arrowscale=4,ArrowFill]{>>->}(-1,0)(2,0)
```



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



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



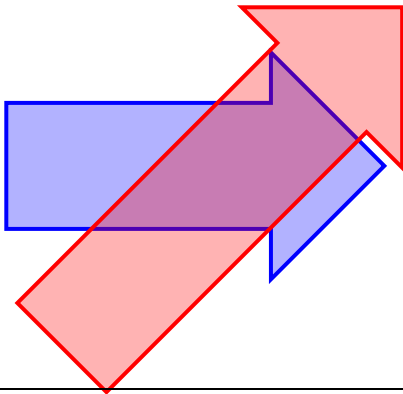
```
\psline[linecolor=blue,arrowscale=4,ArrowFill=false]{>|->|}(-1,0)(2,0)
```

## 1.6 tipcolor option

It is possible to change the color of the arrow tip by setting tipcolor:

Value	Example
\psset{tipcolor=red}	
\psline{->>} (0,1ex) (2.3,1ex)	
\psline[nArrowsA=3]{->>} (0,1ex) (2.3,1ex)	
\psline[nArrowsA=5]{->>} (0,1ex) (2.3,1ex)	
\psline{<<-} (0,1ex) (2.3,1ex)	
\psline[nArrowsA=3]{<<-} (0,1ex) (2.3,1ex)	
\psline[nArrowsA=5]{<<-} (0,1ex) (2.3,1ex)	
\psset{tipcolor=blue}	
\psline{<<->>} (0,1ex) (2.3,1ex)	
\psline[nArrowsA=3]{<<->>} (0,1ex) (2.3,1ex)	
\psline[nArrowsA=5]{<<->>} (0,1ex) (2.3,1ex)	
\psline{<<- } (0,1ex) (2.3,1ex)	
\psline[nArrowsA=3]{<<-<<} (0,1ex) (2.3,1ex)	
\psline[nArrowsA=5]{<<-o} (0,1ex) (2.3,1ex)	
\psline[tipcolor=magenta,nArrowsA=3,nArrowsB=4]{<<-<<} (0,1ex) (2.3,1ex)	
\psline[tipcolor=cyan,nArrowsA=3,nArrowsB=4]{>>->>} (0,1ex) (2.3,1ex)	
\psline[tipcolor=yellow,nArrowsA=1,nArrowsB=4]{>>->>} (0,1ex) (2.3,1ex)	

## 1.7 Big Arrows

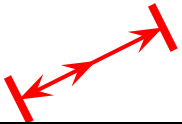


```
\begin{pspicture}(5,5)
\psset{doublesep=1cm}
\psBigArrow[fillstyle=solid,
  fillcolor=blue!30,linecolor=blue](0,3)(5,3)
\psBigArrow[fillstyle=solid,opacity=0.3,
  fillcolor=red,linecolor=red](0.5,0.5)(5,5)
\end{pspicture}
```

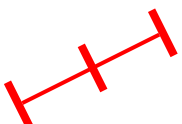
## 1.8 Examples

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

### `\psline`



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



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

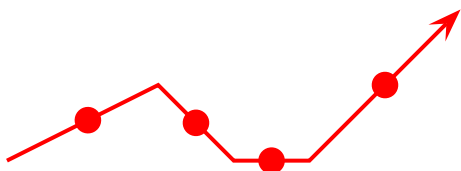




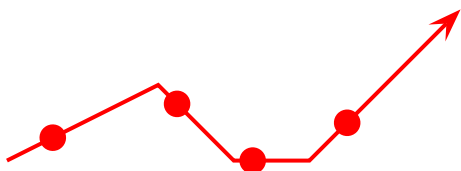
```
\begin{pspicture}(2,2)
\psset{arrowscale=2,ArrowFill=true}
\psline[ArrowInside=->,ArrowInsideNo=2]{->}(2,1)
\end{pspicture}
```



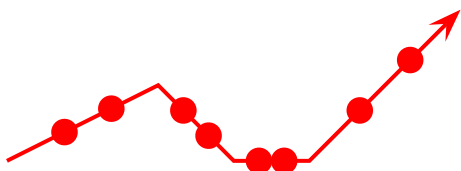
```
\begin{pspicture}(2,2)
\psset{arrowscale=2,ArrowFill=true}
\psline[ArrowInside=->,ArrowInsideNo=2,ArrowInsideOffset=0.1]{->}(2,1)
\end{pspicture}
```



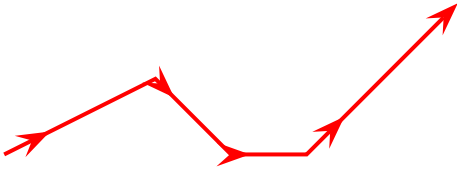
```
\begin{pspicture}(6,2)
\psset{arrowscale=2,ArrowFill=true}
\psline[ArrowInside=-*]{->}(0,0)(2,1)(3,0)(4,0)(6,2)
\end{pspicture}
```



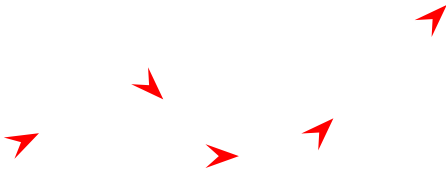
```
\begin{pspicture}(6,2)
\psset{arrowscale=2,ArrowFill=true}
\psline[ArrowInside=-*,ArrowInsidePos=0.25]{->}(0,0)(2,1)(3,0)(4,0)(6,2)
\end{pspicture}
```



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



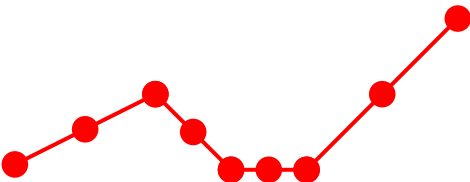
```
\begin{pspicture}(6,2)
\psset{arrowscale=2,ArrowFill=true}
\psline[ArrowInside=->, ArrowInsidePos=0.25]{->}%
(0,0)(2,1)(3,0)(4,0)(6,2)
\end{pspicture}
```



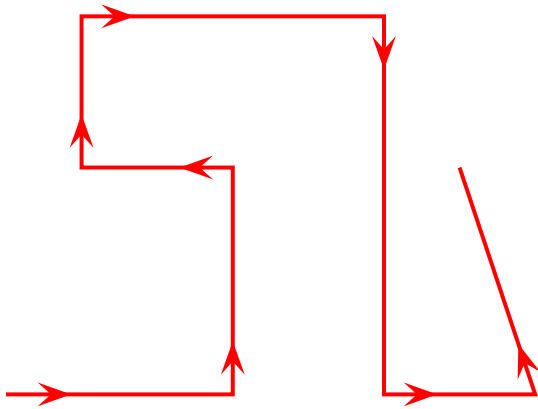
```
\begin{pspicture}(6,2)
\psset{arrowscale=2,ArrowFill=true}
\psline[linestyle=none,ArrowInside=->,ArrowInsidePos=0.25]{->}%
(0,0)(2,1)(3,0)(4,0)(6,2)
\end{pspicture}
```



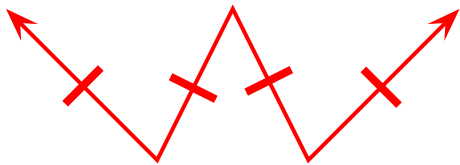
```
\begin{pspicture}(6,2)
\psset{arrowscale=2,ArrowFill=true}
\psline[ArrowInside=-< , ArrowInsidePos=0.75]{->}%
(0,0)(2,1)(3,0)(4,0)(6,2)
\end{pspicture}
```



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

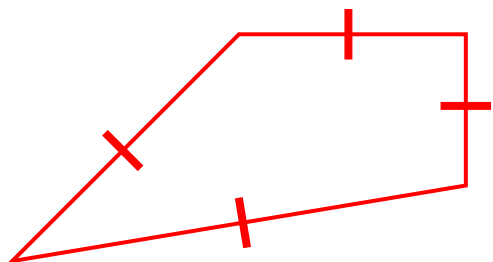


```
\begin{pspicture}(6,5)
\psset{arrowscale=2,ArrowFill=true}
\psline[ArrowInside=->,ArrowInsidePos=20](0,0)(3,0)%
(3,3)(1,3)(1,5)(5,5)(5,0)(7,0)(6,3)
\end{pspicture}
```

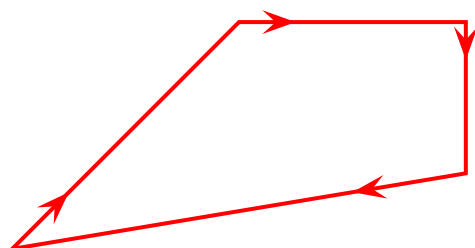


```
\begin{pspicture}(6,2)
\psset{arrowscale=2,ArrowFill=true}
\psline[ArrowInside=-|]{<->}(0,2)(2,0)(3,2)(4,0)(6,2)
\end{pspicture}
```

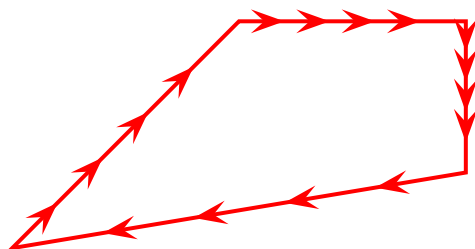
`\pspolygon`



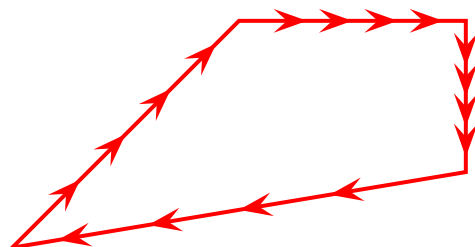
```
\begin{pspicture}(6,3)
\psset{arrowscale=2}
\pspolygon[ArrowInside=-|](0,0)(3,3)(6,3)(6,1)
\end{pspicture}
```



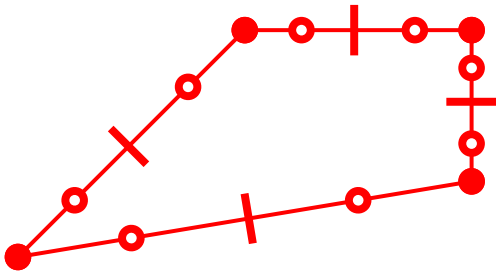
```
\begin{pspicture}(6,3)
\psset{arrowscale=2}
\pspolygon[ArrowInside=->,ArrowInsidePos=0.25]%(0,0)(3,3)(6,3)(6,1)
\end{pspicture}
```



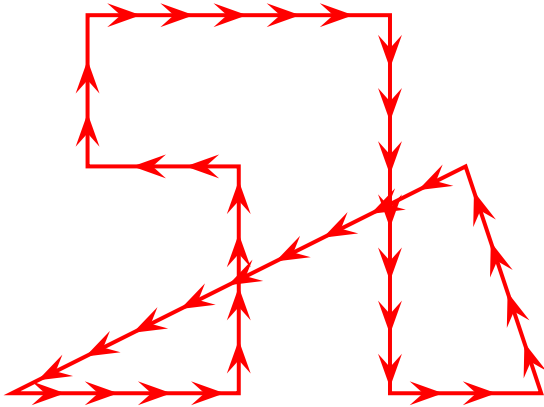
```
\begin{pspicture}(6,3)
\psset{arrowscale=2}
\pspolygon[ArrowInside=->,ArrowInsideNo=4]%(0,0)(3,3)(6,3)(6,1)
\end{pspicture}
```



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

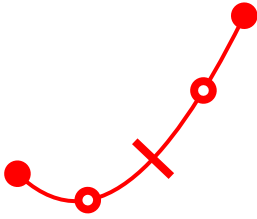


```
\begin{pspicture}(6,3)
\psset{arrowscale=2}
\pspolygon[ArrowInside=-|](0,0)(3,3)(6,3)(6,1)
\psset{linestyle=none,ArrowInside=-*}
\pspolygon[ArrowInsidePos=0](0,0)(3,3)(6,3)(6,1)
\pspolygon[ArrowInsidePos=1](0,0)(3,3)(6,3)(6,1)
\psset{ArrowInside=-o}
\pspolygon[ArrowInsidePos=0.25](0,0)(3,3)(6,3)(6,1)
\pspolygon[ArrowInsidePos=0.75](0,0)(3,3)(6,3)(6,1)
\end{pspicture}
```

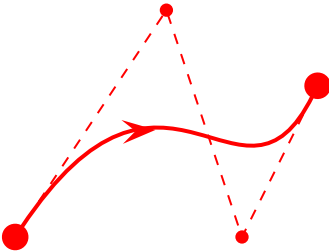


```
\begin{pspicture}(6,5)
\psset{arrowscale=2}
\pspolygon[ArrowInside=->,ArrowInsidePos=20]%(
(0,0)(3,0)(3,3)(1,3)(1,5)(5,5)(5,0)(7,0)(6,3)
\end{pspicture}
```

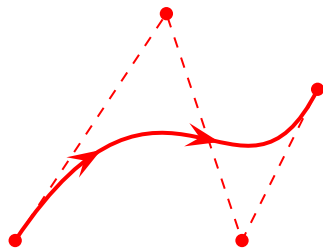
`\psbezier`



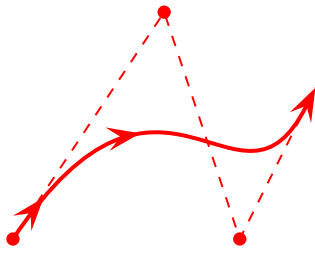
```
\begin{pspicture}(3,3)
\psset{arrowscale=2}
\psbezier[ArrowInside=-|](0,1)(1,0)(2,1)(3,3)
\psset{linestyle=none,ArrowInside=-o}
\psbezier[ArrowInsidePos=0.25](0,1)(1,0)(2,1)(3,3)
\psbezier[ArrowInsidePos=0.75](0,1)(1,0)(2,1)(3,3)
\psset{linestyle=none,ArrowInside=-*}
\psbezier[ArrowInsidePos=0](0,1)(1,0)(2,1)(3,3)
\psbezier[ArrowInsidePos=1](0,1)(1,0)(2,1)(3,3)
\end{pspicture}
```



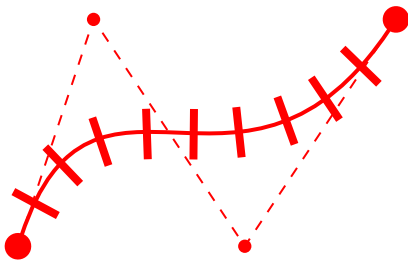
```
\begin{pspicture}(4,3)
\psset{arrowscale=2}
\psbezier[ArrowInside=->,showpoints]%
{*-*}(0,0)(2,3)(3,0)(4,2)
\end{pspicture}
```



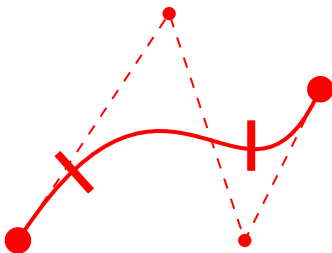
```
\begin{pspicture}(4,3)
\psset{arrowscale=2}
\psbezier[ArrowInside=->,showpoints=true,
ArrowInsideNo=2](0,0)(2,3)(3,0)(4,2)
\end{pspicture}
```



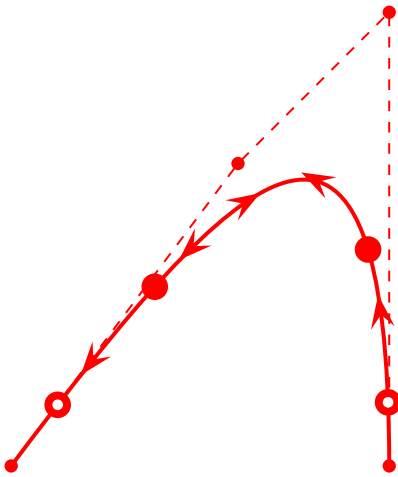
```
\begin{pspicture}(4,3)
\psset{arrowscale=2}
\psbezier[ArrowInside=->,showpoints=true,
  ArrowInsideNo=2,ArrowInsideOffset=-0.2]%(0,0)(2,3)(3,0)(4,2)
\end{pspicture}
```



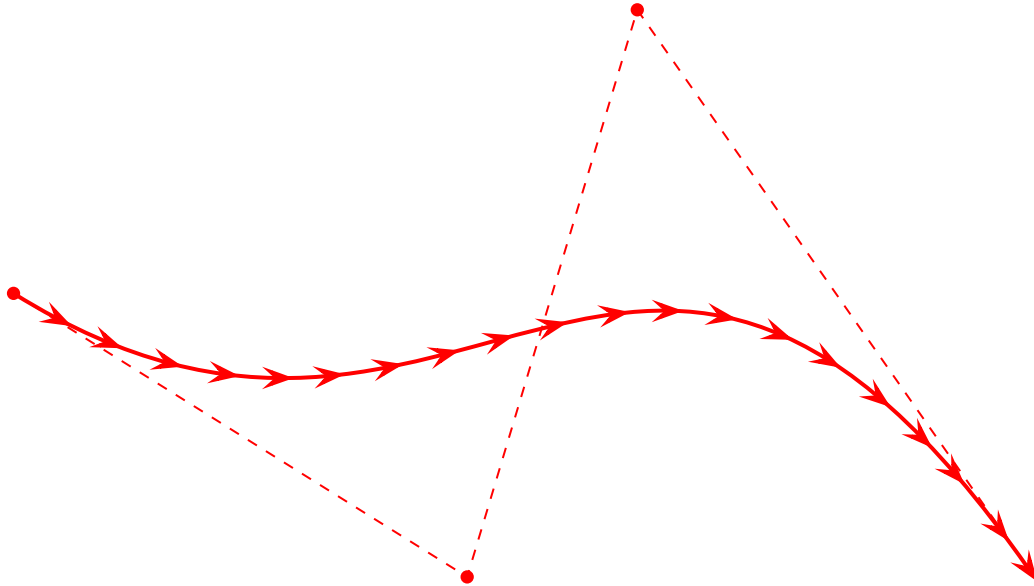
```
\begin{pspicture}(5,3)
\psset{arrowscale=2}
\psbezier[ArrowInsideNo=9,ArrowInside=-|,%,
  showpoints=true]{*-*}(0,0)(1,3)(3,0)(5,3)
\end{pspicture}
```



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



```
\begin{pspicture}(5,6)
\psset{arrowscale=2}
\node(3,4){A}\node(5,6){B}\node(5,0){C}
\psbezier[ArrowInside=->,%
showpoints=true](A)(B)(C)
\psset{linestyle=none,ArrowInside=-<}
\psbezier[ArrowInsideNo=4](0,0)(A)(B)(C)
\psset{ArrowInside=-o}
\psbezier[ArrowInsidePos=0.1](0,0)(A)(B)(C)
\psbezier[ArrowInsidePos=0.9](0,0)(A)(B)(C)
\psset{ArrowInside=-*}
\psbezier[ArrowInsidePos=0.3](0,0)(A)(B)(C)
\psbezier[ArrowInsidePos=0.7](0,0)(A)(B)(C)
\end{pspicture}
```



```
\psset{unit=0.75}
\begin{pspicture}(-3,-5)(15,5)
\psbezier[ArrowInsideNo=19,%
ArrowInside=->,ArrowFill=false,%
showpoints=true]{->}(-3,0)(5,-5)(8,5)(15,-5)
\end{pspicture}
```



### `\pcline`

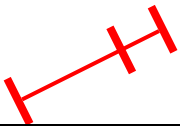
These examples need the package `pst-node`.



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



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



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

$g$



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

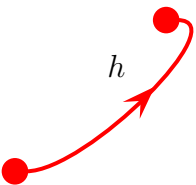
$g$



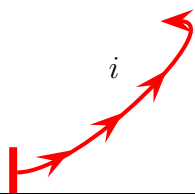
```
\psset{arrowscale=2}
\pcline[ArrowInside=->,ArrowInsidePos=10]{|-|}(0,0)(2,0)
\naput[labelsep=0.3]{\large$l$}
```

### `\pccurve`

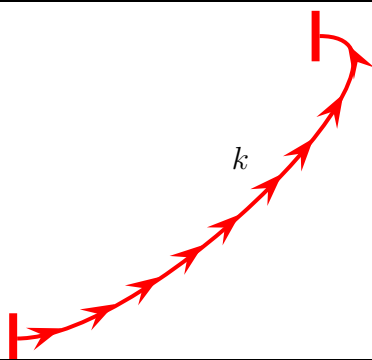
These examples also need the package `pst-node`.



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



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

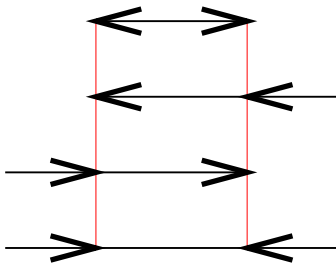


```
\begin{pspicture}(4,4)
\psset{arrowscale=2}
\pccurve[ArrowInside=->,ArrowInsidePos=20]{|-|}(0,0)(4,4)
\naput[labelsep=0.3]{\large$k$}
\end{pspicture}
```

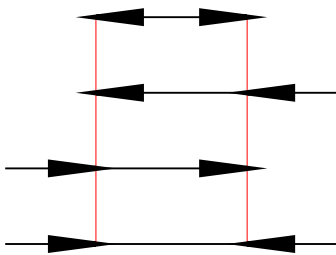
### 1.9 Special arrows v-V,t-T, and f-F

Possible optional arguments are

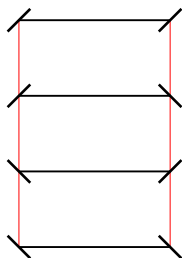
<i>name</i>	<i>meaning</i>
veearrowlength	default is 3mm
veearrowangle	default is 30
veearrowlinewidth	default is 0.35mm
filledveearrowlength	default is 3mm
filledveearrowangle	default is 15
filledveearrowlinewidth	default is 0.35mm
tickarrowlength	default is 1.5mm
tickarrowlinewidth	default is 0.35mm
arrowlinestyle	default is solid



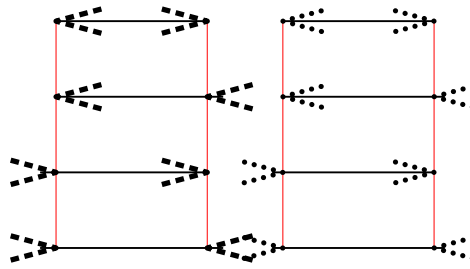
```
\psset{unit=5mm}
\begin{pspicture}(4,6)
  \psset{dimen=middle,arrows=c-c,
    arrowscale=2,linewidth=.25mm}
  \psline[linecolor=red,linewidth=.05mm](0,0)(0,6)
  \psline[linecolor=red,linewidth=.05mm](4,0)(4,6)
  \psline{v-v}(0,6)(4,6)
  \psline{v-V}(0,4)(4,4)
  \psline{V-v}(0,2)(4,2)
  \psline{V-V}(0,0)(4,0)
\end{pspicture}
```



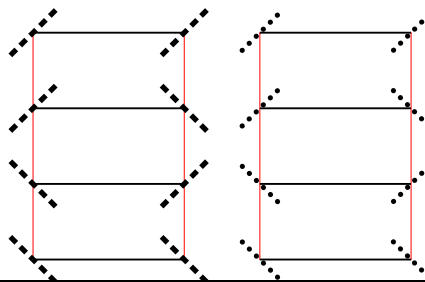
```
\psset{unit=5mm}
\begin{pspicture}(4,6)
  \psset{dimen=middle,arrows=c-c,
    arrowscale=2,linewidth=.25mm}
  \psline[linecolor=red,linewidth=.05mm](0,0)(0,6)
  \psline[linecolor=red,linewidth=.05mm](4,0)(4,6)
  \psline{f-f}(0,6)(4,6)
  \psline{f-F}(0,4)(4,4)
  \psline{F-f}(0,2)(4,2)
  \psline{F-F}(0,0)(4,0)
\end{pspicture}
```



```
\psset{unit=5mm}
\begin{pspicture}(4,6)
  \psset{dimen=middle,arrows=c-c,linewidth=.25mm}
  \psline[linecolor=red,linewidth=.05mm](0,0)(0,6)
  \psline[linecolor=red,linewidth=.05mm](4,0)(4,6)
  \psline{t-t}(0,6)(4,6)
  \psline{t-T}(0,4)(4,4)
  \psline{T-t}(0,2)(4,2)
  \psline{T-T}(0,0)(4,0)
\end{pspicture}
```



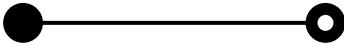
```
\psset{unit=5mm}
\begin{pspicture}(10,6)
\psset{dimen=middle,arrows=c-c,arrowscale=2,linewidth=.25mm,
  arrowlinestyle=dashed,dash=1.5pt 1pt}
\psline[linecolor=red,linewidth=.05mm](0,0)(0,6)
\psline[linecolor=red,linewidth=.05mm](4,0)(4,6)
\psline{v-v}(0,6)(4,6) \psline{v-V}(0,4)(4,4)
\psline{V-v}(0,2)(4,2) \psline{V-V}(0,0)(4,0)
\psline[linecolor=red,linewidth=.05mm](6,0)(6,6)
\psline[linecolor=red,linewidth=.05mm](10,0)(10,6)
\psset{arrowlinestyle=dotted,dotsep=0.8pt}
\psline{v-v}(6,6)(10,6) \psline{v-V}(6,4)(10,4)
\psline{V-v}(6,2)(10,2) \psline{V-V}(6,0)(10,0)
\end{pspicture}
```



```
\psset{unit=5mm}
\begin{pspicture}(10,7)
\psset{dimen=middle,arrows=c-c,arrowscale=2,linewidth=.25mm,
  arrowlinestyle=dashed,dash=1.5pt 1pt}
\psline[linecolor=red,linewidth=.05mm](0,0)(0,6)
\psline[linecolor=red,linewidth=.05mm](4,0)(4,6)
\psline{t-t}(0,6)(4,6) \psline{t-T}(0,4)(4,4)
\psline{T-t}(0,2)(4,2) \psline{T-T}(0,0)(4,0)
\psline[linecolor=red,linewidth=.05mm](6,0)(6,6)
\psline[linecolor=red,linewidth=.05mm](10,0)(10,6)
\psset{arrowlinestyle=dotted,dotsep=0.8pt}
\psline{t-t}(6,6)(10,6) \psline{t-T}(6,4)(10,4)
\psline{T-t}(6,2)(10,2) \psline{T-T}(6,0)(10,0)
\end{pspicture}
```

### 1.10 Special arrow option arrowLW

Only for the arrowtype `o` and `*` it is possible to set the arrowlinewidth with the optional keyword `arrowLW`. When scaling an arrow by the keyword `arrowscale` the width of the borderline is also scaled. With the optional argument `arrowLW` the line width can be set separately and is not taken into account by the scaling value.



```
\begin{pspicture}(4,6)
\psline[arrowscale=3,arrows=-o](0,5)(4,5)
\psline[arrowscale=3,arrows=-o,
arrowLW=0.5pt](0,3)(4,3)
\psline[arrowscale=3,arrows=-o,
arrowLW=0.3333\pslinewidth](0,1)(4,1)
\end{pspicture}
```

## 2 List of all optional arguments for pst-arrow

Key	Type	Default
-----	------	---------

### References

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- [4] Nikolai G. Kollock. *PostScript richtig eingesetzt: vom Konzept zum praktischen Einsatz*. Vaterstetten: IWT, 1989.
- [5] Frank Mittelbach and Michel Goossens et al. *The L<sup>A</sup>T<sub>E</sub>X Companion*. second. Boston: Addison-Wesley Publishing Company, 2004.
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- [7] Herbert Voß. *PSTricks Graphics for L<sup>A</sup>T<sub>E</sub>X*. 1st ed. Cambridge: UIT, 2011.
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