

# **pst-platon**

**A PSTricks package for drawing platonic solids; v.0.01**

Manuel Luque  
Herbert Voß

April 16, 2023

A platonic solid is a convex polyhedron that is a regular polygon. The faces of a platonic solid are congruent regular polygons, with the same number of faces meeting at each vertex. All edges are congruent, as are its vertices and angles. There exists five platonic solids.

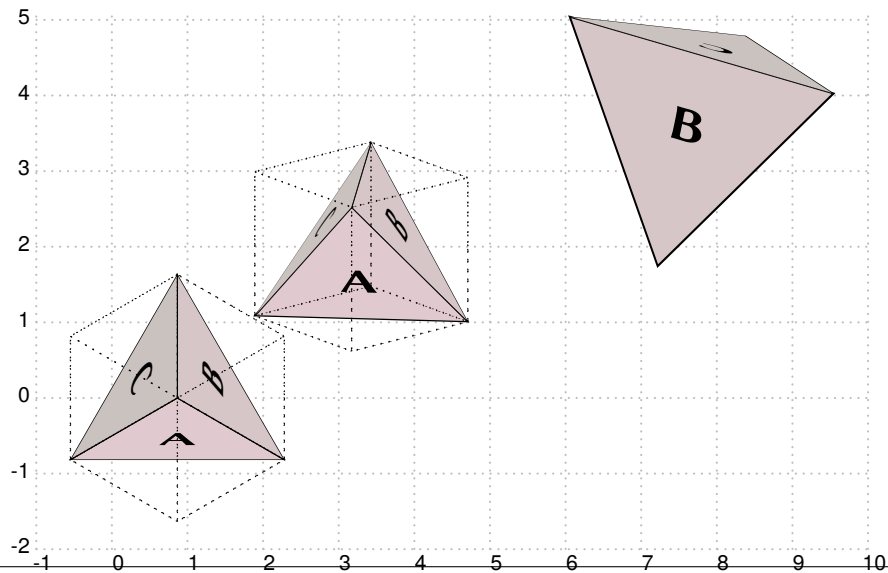
## Contents

<b>1</b>	<b>The optional Arguments</b>	<b>3</b>
1.1	PstPicture . . . . .	3
1.2	Frame . . . . .	3
1.3	Viewpoint . . . . .	4
1.4	faceName . . . . .	4
1.5	faceNameFont . . . . .	4
1.6	psscale . . . . .	4
1.7	Colors . . . . .	5
<b>2</b>	<b>The Platonic Solids</b>	<b>5</b>
2.1	Tetrahedron . . . . .	5
2.2	Hexahedron . . . . .	6
2.3	Octahedron . . . . .	7
2.4	Dodecahedron . . . . .	9
2.5	Isocahedron . . . . .	9
<b>3</b>	<b>List of all optional arguments for pst-platon</b>	<b>10</b>
	<b>References</b>	<b>10</b>

## 1 The optional Arguments

### 1.1 PstPicture

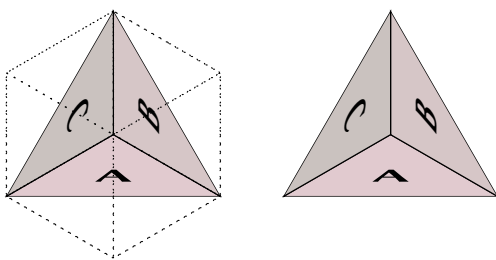
With `PstPicture=true` (default) the image is set into a `pspicture` environment, which reserves some space. The correct bounding box depends to the viewpoint. With setting of `PstPicture=false` you can set the image inside your own `pspicture` environment with other coordinates. All solids are placed relative to the origin of the coordinate system. Use `\rput` to place the platonic solid elsewhere.



```
\begin{pspicture}[showgrid=true](-1,-2)(10,5)
\psTetrahedron[PstPicture=false]
\rput(2,2){\psTetrahedron[PstPicture=false,Viewpoint=1 1.2 0.5]}
\psset{unit=1.3}
\rput(5,3){\psTetrahedron[PstPicture=false,Frame=false,Viewpoint=-1 0.5 2]}
\end{pspicture}
```

### 1.2 Frame

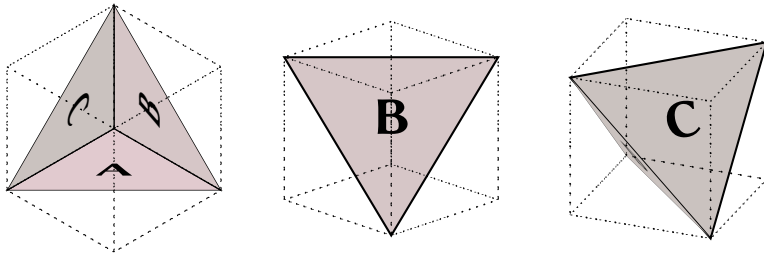
With `Frame=true` (default) the unique cube with  $a=1$  is printed with dotted lines.



```
\psTetrahedron
\psTetrahedron[Frame=false]
```

### 1.3 Viewpoint

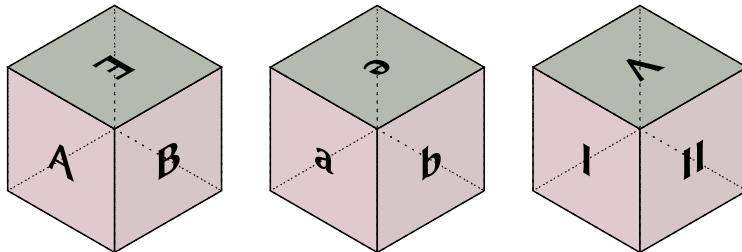
With Viewpoint the three dimensional view point from which the solid is seen can be set. The default is 1 1 1.



```
\psTetrahedron
\psTetrahedron[Viewpoint=-1 1 .5]
\psTetrahedron[Viewpoint=0.4 -1 .5]
```

### 1.4 faceName

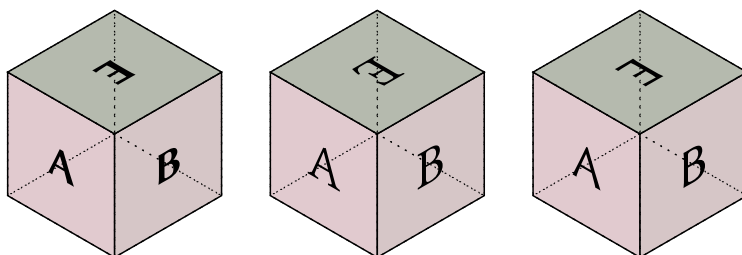
With faceName the name of the faces can be set with setting it to one of the macros \Alph (default), \alph, \arabic, \Roman, and \roman.



```
\psHexahedron%
\psHexahedron[faceName=\alph]%
\psHexahedron[faceName=\Roman]
```

### 1.5 faceNameFont

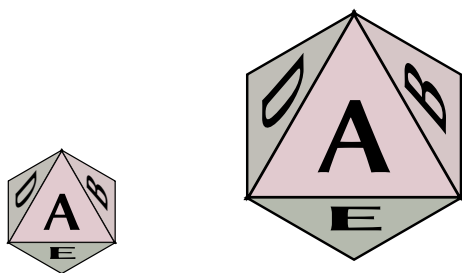
With faceNameFont the font for the face name can be set. Any valid  $\LaTeX$  command is possible.



```
\psHexahedron%
\psHexahedron[faceNameFont=\Huge]%
\psHexahedron[faceNameFont=\Huge\sffamily]
```

### 1.6 psscale

The solids can be magnified by the keyword psscale which is preset to 1.



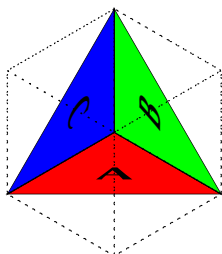
```
\psOctahedron[Frame=false]
\psOctahedron[Frame=false,psscale=2]
```

## 1.7 Colors

The faces are defined by the colors of type A or B with

```
\newcommand\colorTypeA{%
\definecolor{ColorA}{cmyk}{0.1,0.1,0.05,0}
\definecolor{ColorB}{cmyk}{0.15,0.15,0.05,0}
...
}
\newcommand\colorTypeB{%
\definecolor{ColorA}{cmyk}{0.1,0.2,0.1,0}
\definecolor{ColorB}{cmyk}{0.15,0.2,0.15,0}
...
}
```

New types can be defined in the same way and then set by the keyword `colorType=<type>`.

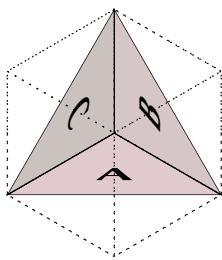


```
\newcommand\colorTypeC{%
\colorlet{ColorA}{red}
\colorlet{ColorB}{green}
\colorlet{ColorC}{blue}
\definecolor{ColorD}{rgb}{0.55,0.2,0.15}
}
\psTetrahedron[colorType=C]
```

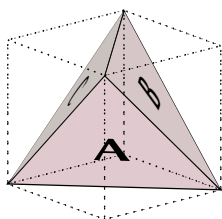
## 2 The Platonic Solids

There are the five platonic solids with the macronames `\psTetrahedron`, `\psHexahedron`, `\psOctahedron`, `\psDodecahedron`, and `\psIcosahedron`.

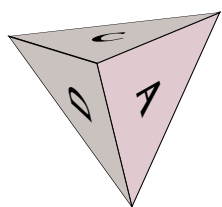
### 2.1 Tetrahedron



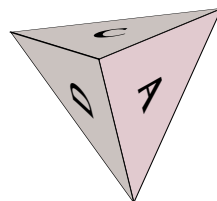
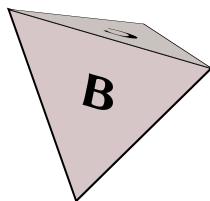
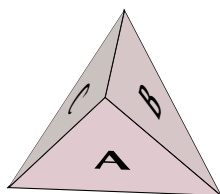
```
\psTetrahedron
```



```
\psTetrahedron[Viewpoint=1 1.2 0.5]
```

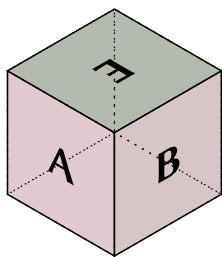


```
\psTetrahedron[Frame=false,Viewpoint=0.7 -0.5 -0.8]
```

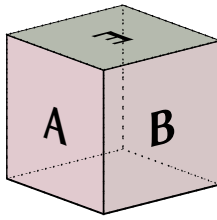


```
\psTetrahedron[Frame=false,Viewpoint=1 1.2 0.7]  
\psTetrahedron[Frame=false,Viewpoint=-1 0.5 2]  
\psTetrahedron[Frame=false,Viewpoint=0.7 -0.5 -0.8]
```

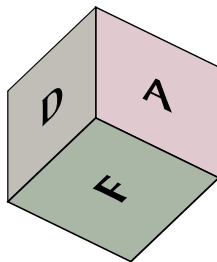
## 2.2 Hexahedron



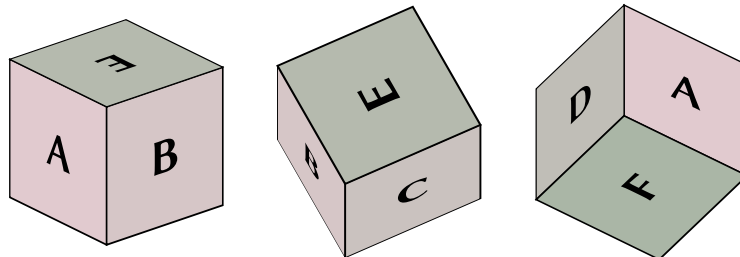
```
\psHexahedron
```



```
\psHexahedron[Viewpoint=1 1.2 0.5]
```

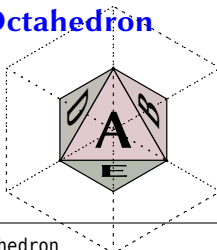


```
\psHexahedron[Frame=false,Viewpoint=0.7 -0.5 -0.8]
```

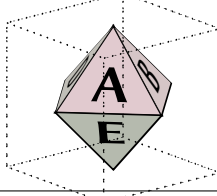


```
\psHexahedron[Frame=false,Viewpoint=1 1.2 0.7]  
\psHexahedron[Frame=false,Viewpoint=-1 0.5 2]  
\psHexahedron[Frame=false,Viewpoint=0.7 -0.5 -0.8]
```

## 2.3 Octahedron



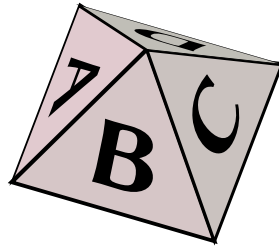
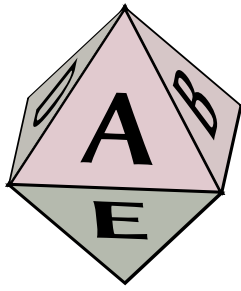
```
\psOctahedron
```



```
\psOctahedron[Viewpoint=1 1.2 0.5]
```



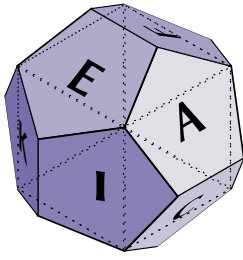
```
\psOctahedron[Frame=false,Viewpoint=0.7 -0.5 -0.8]
```



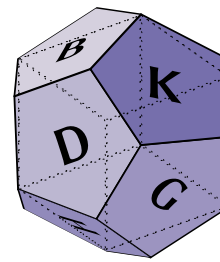
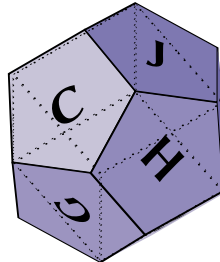
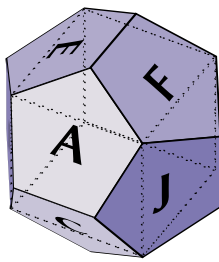
```
\psset{psscale=2}  
\psOctahedron[Frame=false,Viewpoint=1 1.2 0.7]  
\psOctahedron[Frame=false,Viewpoint=-1 0.5 2]  
\psOctahedron[Frame=false,Viewpoint=0.7 -0.5 -0.8]
```



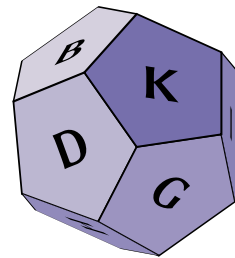
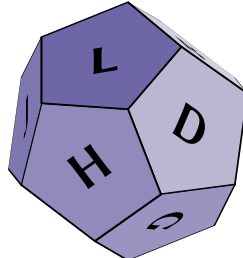
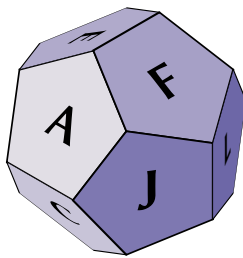
## 2.4 Dodecahedron



```
\psDodecahedron
```

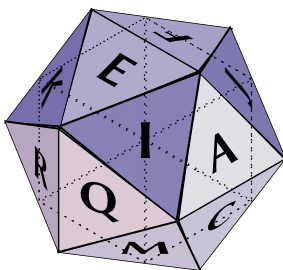


```
\psDodecahedron[Viewpoint=-0.5 0.9 0.9]  
\psDodecahedron[Viewpoint=-0.5 0.7 -1.2]  
\psDodecahedron[Viewpoint=0.5 -0.7 -0.5]
```

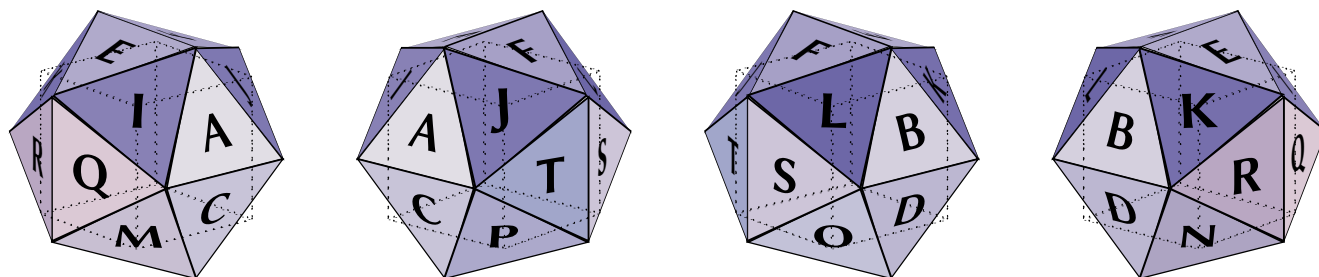


```
\psDodecahedron[Frame=false,Viewpoint=-0.2 0.2 0.2]  
\psDodecahedron[Frame=false,Viewpoint=-0.707 -0.707 -1]  
\psDodecahedron[Frame=false,Viewpoint=0.6 -0.7 -0.5]
```

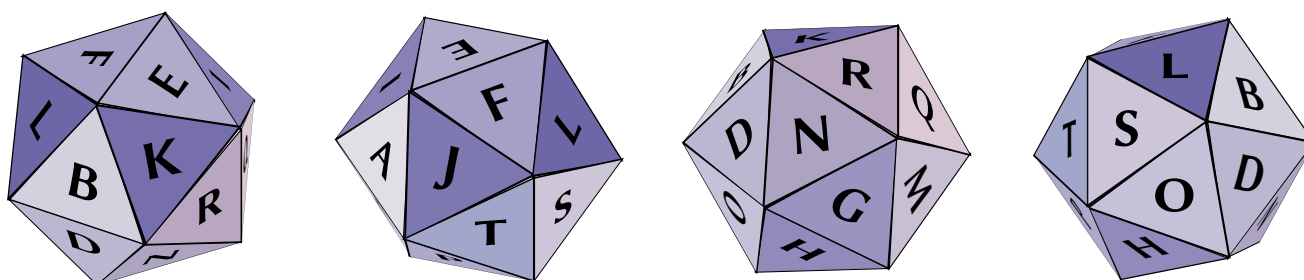
## 2.5 Isocahedron



```
\psIcosahedron
```



```
\psIcosahedron[Viewpoint=1 1.2 0.5]
\psIcosahedron[Viewpoint=-1 1.2 0.5]
\psIcosahedron[Viewpoint=-1 -1.2 0.5]
\psIcosahedron[Viewpoint=1 -1.2 0.5]
```



```
\psIcosahedron[Frame=false,Viewpoint=0.5 -1 1]
\psIcosahedron[Frame=false,Viewpoint=-1 0.5 1.2]
\psIcosahedron[Frame=false,Viewpoint=0.7 -0.5 -0.8]
\psIcosahedron[Frame=false,Viewpoint=-0.7 -0.7 -0.2]
```

### 3 List of all optional arguments for pst-platon

Key	Type	Default
PstPicture	boolean	true
Frame	boolean	true
Viewpoint	ordinary	1 1 1
faceName	ordinary	\Alph
faceNameFont	ordinary	\huge \sffamily \bfseries
colorType	ordinary	A

### References

- [1] Hendri Adriaens. *xkeyval package*. CTAN:/macros/latex/contrib/xkeyval. 2004.
- [2] Denis Girou. “Présentation de PSTricks”. in *Cahier GUTenberg*: 16 (april 1994), pages 21–70.
- [3] Michel Goossens **and others**. *The L<sup>A</sup>T<sub>E</sub>X Graphics Companion*. Reading, Mass.: Addison-Wesley Publishing Company, 2007.
- [4] Alan Hoenig. *T<sub>E</sub>X Unbound: L<sup>A</sup>T<sub>E</sub>X & T<sub>E</sub>X Strategies, Fonts, Graphics, and More*. London: Oxford University Press, 1998.
- [5] Laura E. Jackson **and** Herbert Voß. “Die Plot-Funktionen von pst-plot”. in *Die T<sub>E</sub>Xnische Komödie*: 2/02 (june 2002), pages 27–34.

- [6] Nikolai G. Kollock. *PostScript richtig eingesetzt: vom Konzept zum praktischen Einsatz*. Vaterstetten: IWT, 1989.
- [7] Frank Mittelbach **and** Michel Goossens et al. *Der L<sup>A</sup>T<sub>E</sub>X Begleiter*. zweite. München: Pearson Education, 2005.
- [8] 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.
- [9] Herbert Voß. *Chaos und Fraktale selbst programmieren: von Mandelbrotmengen über Farbmanipulationen zur perfekten Darstellung*. Poing: Franzis Verlag, 1994.
- [10] Herbert Voß. “Die mathematischen Funktionen von PostScript”. **in** *Die T<sub>E</sub>Xnische Komödie*: 1/02 (**march** 2002).
- [11] Herbert Voß. *PSTricks Grafik für T<sub>E</sub>X und L<sup>A</sup>T<sub>E</sub>X*. fifth. Heidelberg/Hamburg: DANTE – Lob.media, 2008.
- [12] Herbert Voß. *Mathematiksatz in L<sup>A</sup>T<sub>E</sub>X*. first. Berlin/Heidelberg: Lehmanns Media/DANTE, 2009.
- [13] Timothy Van Zandt. *multido.tex - a loop macro, that supports fixed-point addition*. [CTAN:/graphics/pstricks/generic/multido.tex](http://www.ctan.org/graphics/pstricks/generic/multido.tex), 1997.
- [14] Timothy Van Zandt. *pst-plot: Plotting two dimensional functions and data*. [CTAN:graphics/pstricks/generic/pst-plot.tex](http://www.ctan.org/graphics/pstricks/generic/pst-plot.tex), 1999.
- [15] Timothy Van Zandt. *PSTricks - PostScript macros for generic T<sub>E</sub>X*. <http://www.tug.org/application/PSTricks>, 1993.
- [16] Timothy Van Zandt **and** Denis Girou. “Inside PSTricks”. **in** *TUGboat*: 15 (**september** 1994), **pages** 239–246.

## Index

\Alph, 4  
\alph, 4  
\arabic, 4

colorType, 5

Environment  
  pspicture, 3

faceName, 4  
faceNameFont, 4  
false, 3  
Frame, 3

Keyword  
  colorType, 5  
  faceName, 4  
  faceNameFont, 4  
  Frame, 3  
  psscale, 4  
  PstPicture, 3  
  Viewpoint, 4

Macro  
  \Alph, 4  
  \alph, 4  
  \arabic, 4  
  \psDodecahedron, 5  
  \psHexahedron, 5  
  \psIcosahedron, 5  
  \psOctahedron, 5  
  \psTetrahedron, 5  
  \Roman, 4  
  \roman, 4  
  \rput, 3

\psDodecahedron, 5  
\psHexahedron, 5  
\psIcosahedron, 5  
\psOctahedron, 5  
pspicture, 3  
psscale, 4  
\psTetrahedron, 5  
PstPicture, 3

\Roman, 4  
\roman, 4  
\rput, 3

true, 3

Value  
  false, 3  
  true, 3  
Viewpoint, 4