pst-pad
A PSTricks package for drawing attachment models

ver. 0.3c

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'pst-pad' is a PSTricks package to draw simple attachment systems.

Contents

1 Introduction

The package 'pst-pad' is a collection of graphical elements based on PStricks that can be used to facilitate display of attachment systems such as two differently shaped surfaces with or without a fluid wedged in between. These macros ease the display of wet adhesion models and common friction systems such as boundary lubrication, elastohydrodynamic lubrication and hydrodynamic lubrication. The name 'pst-pad' was chosen because I used this package to display models of different animal attachment pads in my research.

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2 Parameters

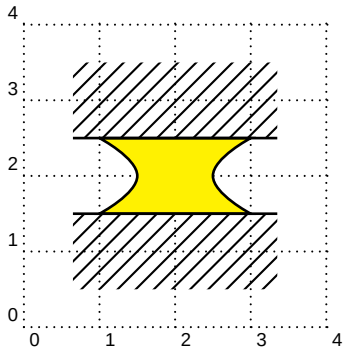
There are specific parameters defined to easily change the behaviour of the pst-pad objects you are drawing.

fluid (boolean): (*default: true*)
WallThickness (dimension): (*default: 1*)
WallString (string): (*default: *)
WallAngle (PSTricks color): (*default: 0*)
WallLineWidth (dimension): (*default: 1pt*)
WallLineColor (PSTricks color): (*default: black*)
SphereStartAngle (dimension): (*default: 180*)
SphereEndAngle (boolean): (*default: 360*)
SphereRadius (dimension): (*default: 1*)
ShpereString (string): (*default: *)
SphereOffset (dimension): (*default: 0*)
SphereFillColor (PSTricks color): (*default: white*)
SphereLineWidth (dimension): (*default: 1pt*)
SphereLineColor (PSTricks color): (*default: black*)
FSphereHeight (dimension): (*default: 2*)
FSphereFillColor (PSTricks color): (*default: lightgray*)
FSphereString (string): (*default: *)
FSphereLineWidth (dimension): (*default: 1pt*)
FSphereLineColor (PSTricks color): (*default: black*)
FluidMaxRadius (dimension): (*default: 1*)
FluidMinRadius (dimension): (*default: .5*)
FluidHeight (dimension): (*default: .5*)
FluidFillColor (PSTricks color): (*default: yellow*)
FluidString (string): (*default: *)
FluidShearOffsetX (dimension): (*default: 0*)
FluidShearOffsetY (dimension): (*default: 0*)
FluidLineWidth (dimension): (*default: 1pt*)
FluidLineColor (PSTricks color): (*default: black*)
StringA (string): (*default: *)
StringB (string): (*default: *)
TotalAngle (angle): (*default: 0*)

3 High-level Macros ("Objects")

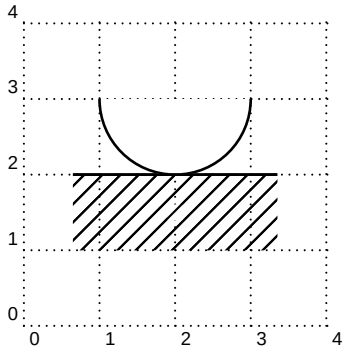
There are three high-level macros: `PstWallToWall`, `PstSphereToWall` and `PstPad`.

3.1 `PstWallToWall`



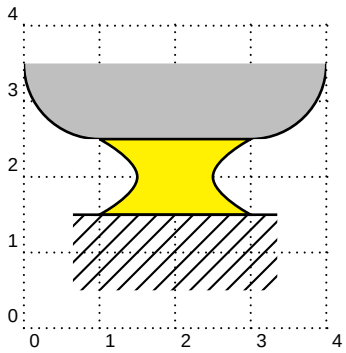

```
\begin{pspicture}(4,4)\psgrid
  \PstWallToWall(2,2)
\end{pspicture}
```

3.2 `PstSphereToWall`




```
\begin{pspicture}(4,4)\psgrid
  \PstSphereToWall[fluid=false](2,2)
\end{pspicture}
```

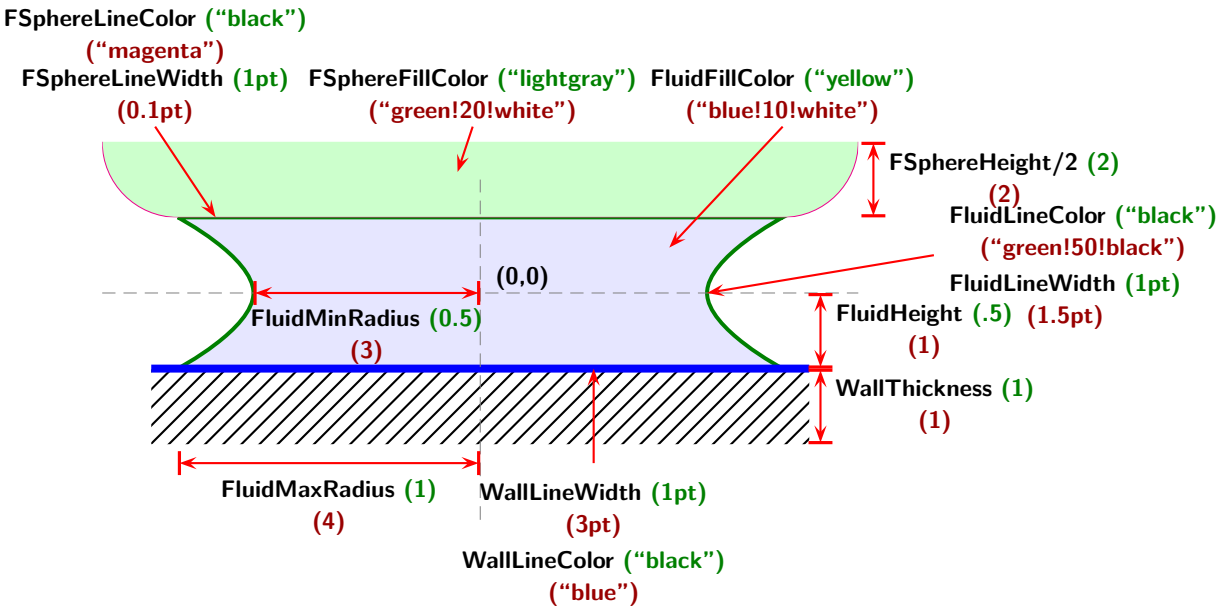
3.3 `PstPad`




```
\begin{pspicture}(4,4)\psgrid
  \PstPad(2,2)
\end{pspicture}
```

3.4 Basic Usage

The following figure shows the usage of some basic parameters with the `PstPad` macro. Green and brown colored values in parentheses give default and example values, respectively.

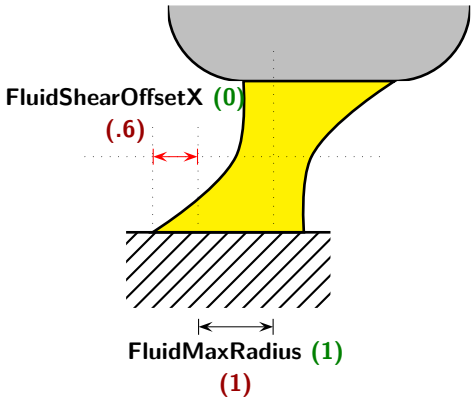


3.5 Liquid shearing

Sheared liquids sandwiched in between two surfaces can also be displayed. The following figures shows the usage of the parameters `FluidShearOffsetX` and `FluidShearOffsetY`. Again, green and brown colored values in parentheses give default and example values, respectively.

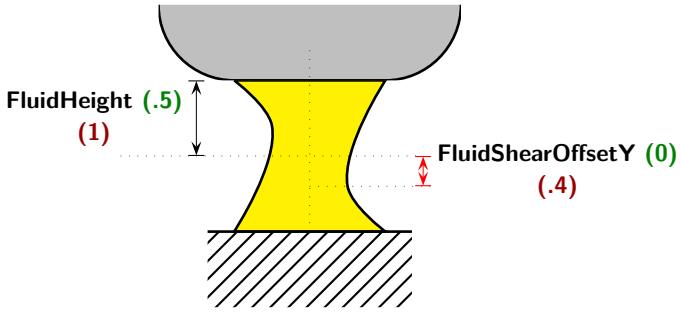
3.5.1 Parameter `FluidShearOffsetX`

`FluidShearOffsetX` describes the x offset from the current value of `FluidMaxRadius`.



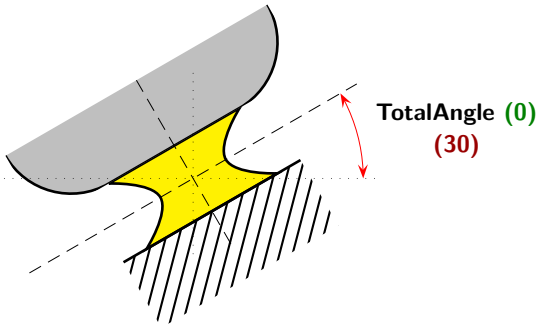
3.5.2 Parameter `FluidShearOffsetY`

`FluidShearOffsetY` describes the y offset from zero to determine the curvature of the meniscus.

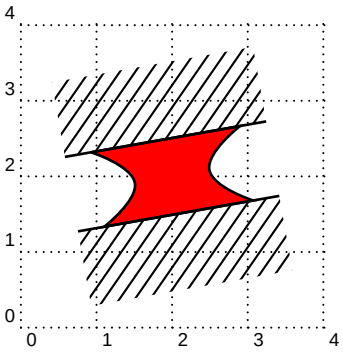


3.6 Tilting parameters

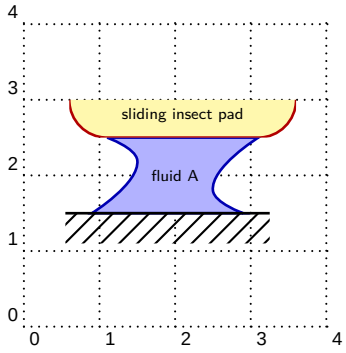
The following figure shows the usage of the `TotalAngle` parameter. The default angle is 0 degrees. Again, green and brown colored values in parentheses give default and example values, respectively.



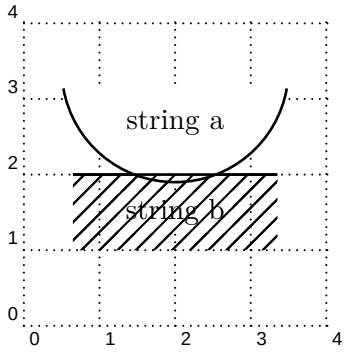
4 Example Usage




```
\begin{pspicture}(4,4)\psgrid
  \PstWallToWall[%
  FluidFillColor=red,%
  TotalAngle=10%
  ](2,2)
\end{pspicture}
```




```
\begin{pspicture}(4,4)\psgrid
  \tiny\sffamily%
  \PstPad[%
  FluidFillColor=blue!30!white,%
  FluidLineColor=blue!70!black,%
  FSphereFillColor=yellow!40!white,%
  FSphereLineColor=red!70!black,%
  FluidString={fluid A},%
  FluidShearOffsetX=0.1,%
  FluidShearOffsetY=0.2,%
  WallThickness=0.4,%
  FSphereHeight=1,%
  StringA={sliding insect pad}%
  ](2,2)
\end{pspicture}
```

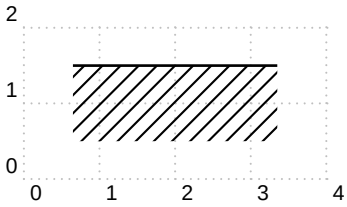



```
\begin{pspicture}(4,4)\psgrid
  \PstSphereToWall[%
  fluid=false,%
  SphereRadius=1.5,%
  SphereStartAngle=190,%
  SphereEndAngle=350,%
  SphereOffset=0.1,%
  StringA={string a},%
  StringB={string b}%
  ](2,2)
\end{pspicture}
```

5 Low-level Macros

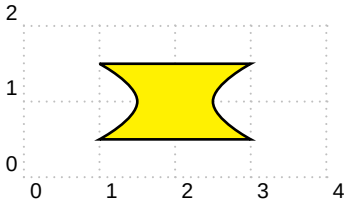
There are four low-level macros: `PstWall`, `PstFluid`, `PstSphere` and `PstFlattenedSphere`.

5.1 `PstWall`



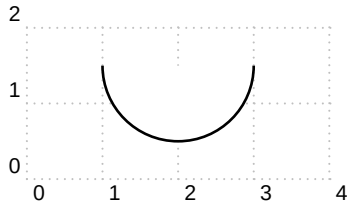

```
  \begin{pspicture}[showgrid=true](4,2)
    \PstWall(2,1.5)
  \end{pspicture}
```

5.2 `PstFluid`



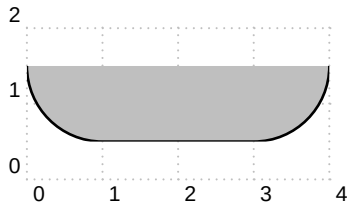

```
  \begin{pspicture}[showgrid=true](4,2)
    \rput(2,1){\PstFluid[unit=1pt](0,0)}
  \end{pspicture}
```

5.3 PstSphere




```
\begin{pspicture}[showgrid=true](4,2)
  \PstSphere(2,.5)
\end{pspicture}
```

5.4 PstFlattenedSphere




```
\begin{pspicture}[showgrid=true](4,2)
  \PstFlattenedSphere(2,.5)
\end{pspicture}
```

6 TODO

- Enhance calculations and number conversions.
- Implement different degrees of surface roughness.
- Implement fluid film contact angle parameter.

7 Acknowledgements

I would like to thank Herbert Voß and Alan Ristow for their help on getting me started with PSTricks macros and low-level calculations in PostScript and TEX.