General Program Information

Input Definitions

- **origin** is a 3,1 matrix with the $x,y,z$ values of the center point of the outlet of the first sedimentation tank
- **width** is the distance between the outlets of the sedimentation tanks or the width of the sedimentation tanks from the center line of the wall on either side of a tank
- **lvltank** is a 3,1 matrix with the $x,y,z$ dimensions of the tank
- **# x** is the distance in the $x$ direction in a top view from the outlet of the first sedimentation tank (or the origin of the first pipe) to the outside wall of the leveling tank
- **# y** is the distance in the $y$ direction in a top view from the outlet of the first sedimentation tank (or the origin of the first pipe) to the outside wall of the leveling tank
- **# z** is the distance in the $z$ direction in a top view from the outlet of the first sedimentation tank (or the origin of the first pipe) to the bottom wall of the platform
- **lvltank thick** is the thickness of the walls of the leveling tank
- **thick** is the thickness of the platform
- **R1** is the inner radius of the pipes leading to the leveling tank
- **R main** is the inner radius of the effluent pipe
- **H main** is the height of the effluent pipe (or the water level in the leveling tank)
- **n** is the number of sedimentation tanks
- **disp** is the displacement of the center of the pipes coming up into the leveling tanks from the inside wall of the tank

Notes

- All coordinates correspond to a top view.
- The floor of the leveling tank is at the same elevation as the top of the platform
Pipe Labeling

Step by Step Description

The Sed eff program is composed of three scripts. The program will run Sedeff script1 when n is 3, Sedeff script2 when n is 4 and Sedeff script3 when n is 5. Because the most common number of sedimentation tanks is three, the output of Sedeff script1 will be described below.

Some points and values which will be used several times in the script are defined outside of the script so as to make it cleaner. These variables will be pseudo inputs for Sedeff script1. They are listed below and will be described in greater detail further down.

- pipe2 origin, pipe3 origin, pipe4 origin, pipe5 origin, pipe6 origin, elbow1 origin, pipe7 origin, tank origin, main origin, origin, lvltank dim, #x, #y, #z, tank thick, thick platform, width sed, R1, R main, H main, n, disp

Pseudo Inputs

pipe3 origin
pipe4 origin
pipe5 origin
pipe6 origin
elbow1 origin
pipe7 origin
tank origin
main origin
origin
lvltank dim
#x
#y
#z
thick tank
thick platform
width_{sed}

R_{1}

R_{main}

H_{main}

n - number of sedimentation tanks to be drawn by the program.

disp

layer1 - Creates a 'lvlpipe' layer for all of the pipes in the program

Pipe1 - Creates a pipe with a radius of $R_1$ and an origin at the variable "origin". See Pipe Help for details on the pipe function.

Pipe1 Length = \#x + \text{thick}_{tank} + \text{offset} - \text{ElbowRadius}

Notes:
- Pipe1 Length is not a variable, the values are inputed directly into the pipe function
- offset is a function which divides the x dimension of the level tank by the number of sedimentation tanks, so as to evenly space the inlet pipes to the tank.
- ElbowRadius is the radius of curvature of an elbow. In the script it is given as a function of the inner radius. This function is defined in the [Pipe Database program]

Rotate1 - Pipe 1 is rotated using the Rotate3d function so that from a top view it is oriented in the west to east direction

p1:
  - x: \text{origin}_0 + R_1
  - y: \text{origin}_1
  - z: \text{origin}_2

p2: \text{origin}

axis: "y"

#: -90

Pipe2 - Creates a pipe with a radius of $R_1$ and an origin at the variable "\text{pipe2_{origin}}".

pipe2_{origin} =
  - x: x,\text{origin} - \text{Pipe1 Length}
  - y: y,\text{origin} + \text{ElbowRadius}
  - z: z,\text{origin}

Pipe2 Length = \#y - 2\text{ElbowRadius} + \text{thick}_{tank} + \text{disp}

Rotate2 - Pipe 2 is rotated using the Rotate3d function so it is oriented north to south in top view

p1:
  - x: \text{pipe2_{origin}0} + R_1
  - y: \text{pipe2_{origin}1}
  - z: \text{pipe2_{origin}2}

p2: \text{pipe2_{origin}}

axis: "x"

#: -90

Pipe3 - Creates a pipe with a radius of $R_1$ and an origin at the variable "\text{pipe3_{origin}}".
Pipe3 Length = #x + thick tank + 2offset(lvltank dim0, n) - elbowRadius(2R1)

**Rotate3** Pipe 3 is rotated using the Rotate3d function so that from a top view it is oriented in the west to east direction.

p1:
- x: pipe3 origin + R1
- y: pipe3 origin1
- z: pipe3 origin2

p2: pipe3 origin

axis: "y"
#: -90

**Pipe4** - Creates a pipe with a radius of R1 and an origin at the variable "pipe4 origin".

Pipe4 Length = #y + width sed - 2ElbowRadius(2R1) + thick tank + disp

**Rotate4** Pipe 4 is rotated using the Rotate3d function so that from a top view it is oriented in the west to east direction.

p1:
- x: pipe4 origin0 + R1
- y: pipe4 origin1
- z: pipe4 origin2

p2: pipe4 origin

axis: "y"
#: -90

**Pipe5** - Creates a pipe with a radius of R1 and an origin at the variable "pipe5 origin".

Pipe5 length: #x + thick tank + 3offset(lvltank dim0, n) - ElbowRadius(2R1)

**Rotate5** Pipe 5 is rotated using the Rotate3d function so that from a top view it is oriented in the west to east direction.

p1:
- x: pipe5 origin0 + R1
- y: pipe5 origin1
- z: pipe5 origin2

p2: pipe5 origin

axis: "y"
#: -90

**Pipe6** - Creates a pipe with a radius of R1 and an origin at the variable "pipe6 origin".

Pipe6 length: #y + 2width sed - 2ElbowRadius(2R1) + thick tank + disp

**Rotate6** Pipe 6 is rotated using the Rotate3d function so it is oriented north to south in top view.

**Pipe7** - Creates a pipe with a radius of R1 and an origin at the variable "pipe7 origin".

Pipe7 length: #z - ElbowRadius(2R1) + thick platform
zoom\textsubscript{win1} - Zoom\textsubscript{win} creates a close-up window by using two points to specify the window size the object is to be viewed in.

p1: tank\textsubscript{origin}

p2:
  \begin{itemize}
  \item x: tank\textsubscript{origin0} - lvltank\textsubscript{dim0}
  \item y: tank\textsubscript{origin1} + lvltank\textsubscript{dim1}
  \item z: tank\textsubscript{origin2}
  \end{itemize}

Copy\textsubscript{5} - Copy\textsubscript{C} creates a copy of the selected objects based on four chosen points.

p1:
  \begin{itemize}
  \item x: pipe7\textsubscript{origin0} + R1
  \item y: pipe7\textsubscript{origin1}
  \item z: pipe7\textsubscript{origin2}
  \end{itemize}

p2: pipe7\textsubscript{origin}

p3:
  \begin{itemize}
  \item x: -offset(lvltank\textsubscript{dim0},n)
  \item y: 0
  \item z: 0
  \end{itemize}

p4:
  \begin{itemize}
  \item x: -2offset(lvltank\textsubscript{dim0},n)
  \item y: 0
  \item z: 0
  \end{itemize}

Pipe\textsubscript{8} - Creates a pipe with a radius of R\textsubscript{main} and an origin at the variable "main\textsubscript{origin}".

Pipe\textsubscript{8} length: H\textsubscript{main} + thick\textsubscript{platform} + #z

layer\textsubscript{2} - Layer\textsubscript{set} select the layer "0"

layer\textsubscript{3} - Layer\textsubscript{freeze} is used to freeze the layer "lvlpipe."

layer\textsubscript{4} - Layer\textsubscript{new} is used to create a new, green layer "lvlelbow."

Elbow\textsubscript{1} - Calls the Elbow Program program to build an elbow with the origin elbow1\textsubscript{origin} and an inner radius, R1.

Rotate\textsubscript{7} - Pipe 7 is rotated using the Rotate\textsubscript{3d} function so...

p1:
  \begin{itemize}
  \item x: elbow1\textsubscript{origin0}
  \item y: elbow1\textsubscript{origin1} + ElbowRadius(2R1)
  \item z: elbow1\textsubscript{origin2}
  \end{itemize}

p2:
  \begin{itemize}
  \item x: elbow1\textsubscript{origin0}
  \item y: elbow1\textsubscript{origin1} + ElbowRadius(2R1)
  \item z: elbow1\textsubscript{origin2}
  \end{itemize}

axis: "z"

#: -180

zoom\textsubscript{win2}
**Copy1** - *CopyB* creates a copy of the selected objects based on three chosen points.

p1: pipe2\textsubscript{origin}
p2: pipe2\textsubscript{origin}
p3: pipe4\textsubscript{origin}

**Copy2** - *CopyB* creates a copy of the selected objects based on three chosen points.

p1: pipe2\textsubscript{origin}
p2: pipe2\textsubscript{origin}
p3: pipe6\textsubscript{origin}

**Copy3** - *CopyB* creates a copy of the selected objects based on three chosen points.

p1: pipe2\textsubscript{origin}
p2: pipe2\textsubscript{origin}
p3: pipe11

**Rotate8** - Pipe 2 is rotated using the \texttt{Rotate3d} function so it is oriented north to south in top view.

p1:
- x: pipe2\textsubscript{origin0}
- y: pipe2\textsubscript{origin1} + (#y - 2ElbowRadius(2R1) + thick\textsubscript{tank} + disp)
- z: pipe2\textsubscript{origin2}

p2:
- x: pipe2\textsubscript{origin0}
- y: pipe2\textsubscript{origin1} + (#y - 2ElbowRadius(2R1) + thick\textsubscript{tank} + disp)
- z: pipe2\textsubscript{origin2}

axis: "x"
#: \textdegree180

**Rotate9** - Pipe 2 is rotated using the \texttt{Rotate3d} function so that from a top view it is oriented in the west to east direction.

p1:
- x: pipe2\textsubscript{origin0}
- y: pipe2\textsubscript{origin1} + (#y - 2ElbowRadius(2R1) + thick\textsubscript{tank} + disp)
- z: pipe2\textsubscript{origin2}

p2:
- x: pipe2\textsubscript{origin0}
- y: pipe2\textsubscript{origin1} + (#y - 2ElbowRadius(2R1) + thick\textsubscript{tank} + disp)
- z: pipe2\textsubscript{origin2}

axis: "y"
#: -90

**Copy4** *CopyC* creates a copy of the selected objects based on four chosen points.

p1:
- x: pipe2\textsubscript{origin0}
\[ y: \text{pipe2}_{\text{origin1}} + (#y - 2\text{ElbowRadius}(2R1)) + \text{thick}_{\text{tank}} + \text{disp} \]
\[ z: \text{pipe2}_{\text{origin2}} \]

**p2:**

\[ x: \text{pipe2}_{\text{origin0}} \]
\[ y: \text{pipe2}_{\text{origin1}} + (#y - 2\text{ElbowRadius}(2R1)) + \text{thick}_{\text{tank}} + \text{disp} \]
\[ z: \text{pipe2}_{\text{origin2}} \]

**p3:**

\[ x: -\text{offset(lvltank}_{\text{dim0}}, n) \]
\[ y: 0 \]
\[ z: 0 \]

**p4:**

\[ x: -2\text{offset(lvltank}_{\text{dim0}}, n) \]
\[ y: 0 \]
\[ z: 0 \]

**layer5** - \text{Layer} \_set select the layer "0"

**layer6** - \text{Layer} \_freeze freezes the layer "lvlelbow."

**layer7** - \text{Layer} \_new creates a new grey layer "lvltank."

**Tank** - Calls the \text{Tank Program} program to build a tank with the origin \text{tank} \_origin, tank dimensions \text{tank} \_dim and thickness \text{thick} \_tank.

\[ \text{tank} \_origin \] - a 3 by 1 matrix with \( x,y,z \) positions corresponding to the point where the tank will be drawn

\[ \text{tank} \_dim \] - a 3 by 1 matrix with \( x,y,z \) positions corresponding to the length, width and height dimensions of the tank

\[ x: \text{tank} \_dim_0 = \text{length} \]
\[ y: \text{tank} \_dim_1 = \text{width} \]
\[ z: \text{tank} \_dim_2 = \text{height} \]

**thick** - the thickness of the wall of the tank

**layer8** - \text{Layer} \_thaw unfreezes the layer "lvlpipe."

**layer9** - \text{Layer} \_thaw unfreezes the layer "lvlelbow."

**layer10** - \text{Layer} \_set select the layer "lvlpipe."

**cylinder** - \text{Cylinder} \_C creates a cylinder based on a point, radius and length.

**p1:** \text{main} \_origin

\[ R1: R_{\text{main}} \]
\[ L: H_{\text{main}} + \text{thick}_{\text{platform}} + \#z \]

**subtract** - \text{Subtract} \_D subtracts based on two points.

**p1:** \text{tank} \_origin

**p2:**

\[ x: \text{main} \_origin_0 + R_{\text{main}} \]
\[ y: \text{main} \_origin_1 \]
\[ z: \text{main} \_origin_2 \]
one
two
three
return