Documentation for the use of the *tikzcivil* package

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Chapter 1

Drawing for the Structural Analysis

The following commands are designed to be used in the description of typical civil engineering problems. Each command will have a brief description of its use and one or two examples. The commands also accept different options, that affect a variety of properties in each drawing. This options are also presented in a table positioned in the same section as the description of the command.

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1.1 Commands

1.1.1 \axisTwo This commands allows to draw a two-dimensional axis, where the name of each of the perpendicular directions must be given by the user. It is useful when one needs to specify the degrees of freedom of a system or part of a system, when there is no rotation involved.

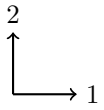


Figure 1.1: 2D axis.

```
\begin{tikzpicture}
  \axisTwo[]{1}{2}
\end{tikzpicture}
```

Table 1.1: Options for the \axisTwo command

Option	Description	default
size	defines the size of the axis (length of one arrow)	**30pt**
position	(tuple) defines the position of the support	**{0,0}**
rotate	rotation in degrees (counterclockwise)	**0**

1.1.2 \axisTwoRot This commands allows to draw a two-dimensional axis, where the name of each of the perpendicular directions must be given by the user. It is useful when one needs to specify the degrees of freedom (dof) of a system or part of a system, when a rotational dof is involved.

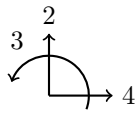


Figure 1.2: 2D axis with rotation dof.

```
\begin{tikzpicture}
  \axisTwoRot[]{1}{2}{3}
\end{tikzpicture}
```

Table 1.2: Options for the \axisTwoRot command

Option	Description	default
size	defines the size of the axis (length of one arrow)	**30pt**
position	(tuple) defines the position of the support	**{0,0}**
rotate	rotation in degrees (counterclockwise)	**0**

1.1.3 \Support

This command is used to generate different types of supports, like fixed, pinned or sliding supports. They can also be rotated.

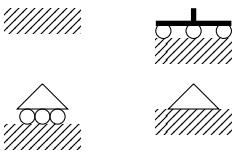


Figure 1.3: Types of supports available.

```
\begin{tikzpicture}[scale=1.0]
  \Support[width = 1cm, type=fixed]
  \Support[position={2cm,0cm}, angle=0,
          width = 1cm, type=fixedsliding]
  \Support[position={0cm,-2cm}, angle=0,
          width = 1cm, type=sliding]
  \Support[position={2cm,-2cm}, angle=0,
          width = 1cm, type=pinned]
\end{tikzpicture}
```

Table 1.3: Options for the \Support command

Option	Description	default
width	defines the width of the support	**1cm**
position	(tuple) defines the position of the support	**{0,0}**
type	defines the type of support. Alternatives: fixed, pinned, sliding, fixedsliding	**fixed**
angle	rotation in degrees of the support (counterclockwise)	**0**

1.1.4 \MassWithSpring

This command draws a typical mass-spring system. It supports also an optional damper and displacement. The basic behavior of this command is shown in fig. 1.4.

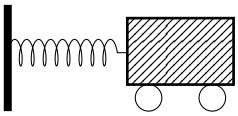


Figure 1.4: Mass-Spring system

```
\begin{tikzpicture}[scale=1]
  \MassWithSpring[]
\end{tikzpicture}
```

Table 1.4: Options for the \MassWithSpring command

Option	Description	default
position	(tuple) defines the position of the support	**{0,0}**
displacement	defines the displacement of the mass. Positive as well as negative values are accepted.	**0**
with damper	boolean variable. Defines if the system should have a damper.	**false**
with wall	boolean variable. Specifies if the wall should be drawn.	**true**

In many situations we would like to describe more interesting systems. This can be achieved applying the optional key values and using the command multiple times, as shown in fig 1.5. As it can bee seen, creating this kind of drawings is very easy and straightforward.

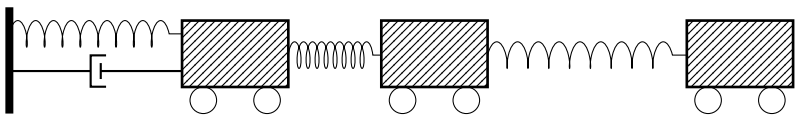


Figure 1.5: More complex mass-spring system

```
\begin{tikzpicture}[scale=1]
  \MassWithSpring[displacement = 2em, with damper = true]
  \MassWithSpring[displacement = -1em, with wall = false,
                  position = {10.5em,0em}]
```

```
  \MassWithSpring[displacement = 3em, with wall = false,
                  position = {18.0em,0em}]
\end{tikzpicture}
```

1.1.5 \Frame Thus command draws a frame with its mass concentrated above. It is a very common model to describe later a multi-story building in 2D. This command has many options, useful to change the displacement, position, use of supports, damper, among others. In the fig. 1.6 can be seen the normal output of the command without any options.

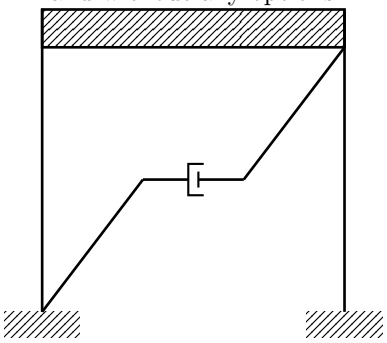


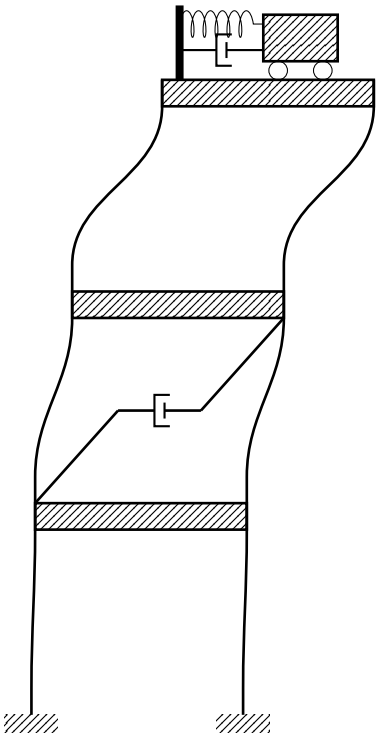
Figure 1.6: A frame with the mass concentrated at the top.

```
\begin{tikzpicture}[scale=1]
  \Frame[with damper=true]
\end{tikzpicture}
```

Table 1.5: Options for the `\Frame` command

Option	Description	default
`height`	defines the height of the frame/story	**4cm**
`width`	defines de width of the frame	**4cm**
`mass thickness`	defines the thickness of the concentrated mass	**0.4cm**
`position`	(tuple) defines the position of the base of the left column	**{0,0}**
`with support`	boolean option, that allows to show supports or not	**true**
`with damper`	boolean option, that defines the presence of a damper in the system	**false**
`displacement`	defines the amount of horizontal displacement on the top of the frame	**0cm**

As with the `\MassWithSpring` command, we can create more complex structures, and even add some displacement to it or add a tuned mass damper on the top (why not?). This can be seen on fig. 1.7.

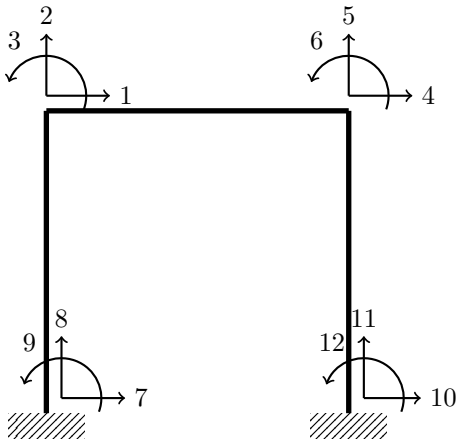


```
\begin{tikzpicture}[scale=0.7]
  \Frame[position = {0em,0em}, displacement=0.07cm]
  \Frame[position = {0.07cm,4cm}, with support=false, displacement
      =0.7cm]
  \Frame[position = {0.77cm,8cm}, with support=false, displacement
      =1.7cm]
  \MassWithSpring[position={2.8cm,12cm}, with damper=true]
\end{tikzpicture}
```

Figure 1.7: A set of frames put one above he other.

1.1.6 \FrameSimple

The \Frame command is best suited for dynamic systems, so when we want to draw a frame for other purposes, we should use this command. It creates a nice frame with bars, whose support's type can be changed. It also allows to vary its dimensions (width and hight) and makes possible to move each degree of freedom separately.




```
\begin{tikzpicture}[scale=1]
  \FrameSimple[]
  \axisTwoRot[position={0.0cm,4.2cm}]{1}{2}{3}
  \axisTwoRot[position={4.0cm,4.2cm}]{4}{5}{6}
  \axisTwoRot[position={0.0cm,0.2cm}]{7}{8}{9}
  \axisTwoRot[position={4.0cm,0.2cm}]{9}{11}{12}
\end{tikzpicture}
```

Figure 1.8: A simple frame.

Table 1.6: Options for the `\FrameSimple` command

Option	Description	default
`width`	defines the width of the frame	**4cm**
`height`	defines the height of the frame	**4cm**
`position`	(tuple) defines the position of the support	**{0,0}**
`left support`	left support type (see 1.1.3 for more details.)	**fixed**
`right support`	left support type (see 1.1.3 for more details.)	**fixed**
`dofX`	moves/rotate degree of freedom "X".	`0`

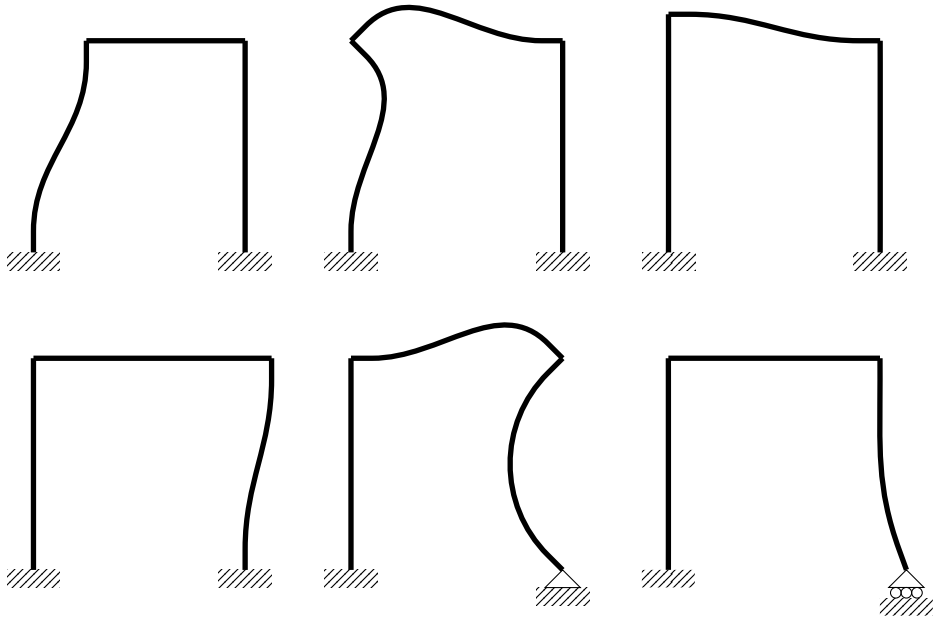


Figure 1.9: Moving different DOF's

Chapter 2

Drawings for the Geomechanics

This chapter presents the commands dedicated to facilitate the creation of drawings for the geomechanics. Like in the previous chapter, every command will be presented with an example and with the description of the options that can be passed to the command.

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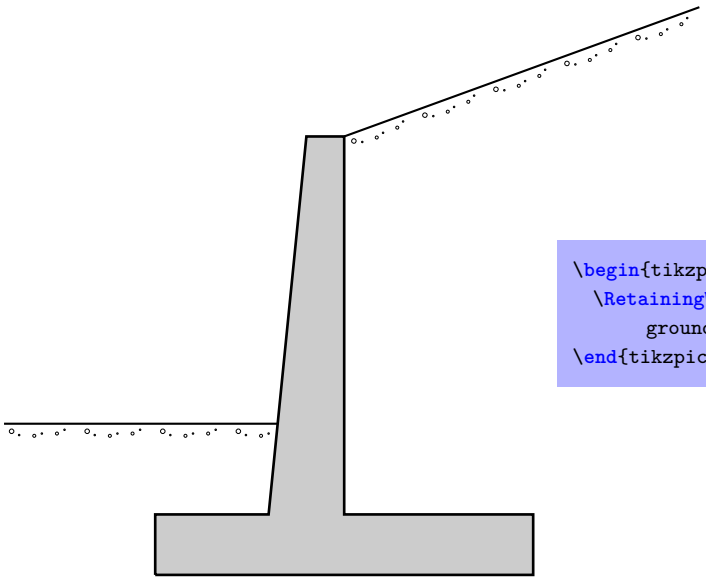
2.1 Commands

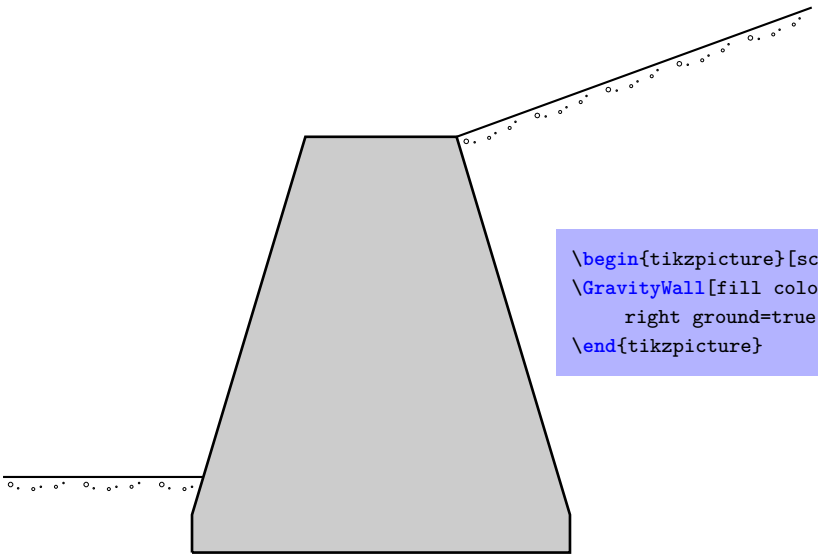
2.1.1 \RetainingWall Description.



```
\begin{tikzpicture}[scale=1]
  \RetainingWall[fill color=black!20, left ground=true, right
      ground=true]
\end{tikzpicture}
```

Figure 2.1: Retaining Wall

2.1.2 \GravityWall Description.



```
\begin{tikzpicture}[scale=1]
\GravityWall[fill color=black!20, beta=20, left ground=true,
    right ground=true, left ground height=1cm]
\end{tikzpicture}
```

Figure 2.2: Gravity Wall