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How to Use the `graphicx` Package

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Abstract. This guide explains how to import and manipulate graphics into your article for inclusion in a volume of proceedings in the ASP Conference Series.

1. Introduction

Given the widely varying degrees of familiarity with LaTeX of our authors, we feel that the `\plotone`, `\plottwo`, and `\plotfiddle` commands will serve most purposes. However, those who are more *au fait* with LaTeX might wish to use the `graphicx` package. This package enables the user to wield far greater control over the importation of graphics into a `.tex` file and, apart from the usual sizing and rotational facilities, also enables the user to crop or trim an image as desired (e.g., to get rid of surrounding blank margins). The `graphicx` package is useful if you need to use only a part of a complete image. This guide will take you through the various parameter ("keys") of the package and applying them to the sample figure `demo.eps` (copied from Kopka & Daly 1999).

2. Invoking `graphicx`

The first step to take is to ensure that you have the command

```
\usepackage{graphicx}
```

in the preamble of your article. Importing a graphic is then done by usingthe command

`\includegraphics[`*key1* = ..., *key2* = ..., *etc.*`]{`*filename*`}`
Optional parameters—called "keys"—enable the figure to be resized, rotated, cropped, trimmed, etc. These keys and their functions are listed below.

- `scale =` *number* — a magnification factor
- `width =` *length* — the width to which the figure should be scaled[1]

[1]If the height is not given, it too is scaled by the same amount.

- `height = ` *length* — the height to which the figure should be scaled[2]
- `totalheight = ` *length* — height plus depth of figure (to be used if figure is rotated)
- `keepaspectratio = true/false` — maintains the height/width ratio
- `angle = ` *number* — angle (in degrees) by which the figure is to be rotated counterclockwise
- `origin = ` *location*[3] — the point about which rotation is to occur
- `draft = true/false` — prevents figure from being imported, but created a named box with the dimensions of the figure (this option is used to speed up processing)
- `clip = true/false` — excludes whatever is outside the bounding box
- `bb = ` *llx lly urx ury* — enters the bounding box coordinates, which are given by default in points (1/72 inch), manually (the bounding box might be missing or you might want to alter it)
- `viewport = ` *llx lly urx ury* — specifies bounding box w.r.t. bottom left of existing bounding box; used with `clip` to select a part of the image (or to clear unwanted margins.
- `trim = ` *dllx dlly durx dury* — reduces the bounding box by the amount specified
- `hiresbb = true/false` — reads the bounding box information from the line `%%HiResBoundingBox` in figure file

3. Experimenting with `graphicx`

Figure 1 shows the default image produced by the graphics file `demo.eps`, called using the command

```
\includegraphics{demo}
```

(note that none of the keys is used).

Figure 2 shows the same figure scaled by a factor of three and rotated by 60 degrees anticlockwise and using the command

```
\includegraphics[scale = 3, angle = 60]{demo}
```

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[2]If the width is not given, it too is scaled by the same amount.

[3]`bl` = bottom left, `c` = center, `t` = top, `r` = right, `B` = baseline, or any meaningful combination thereof.

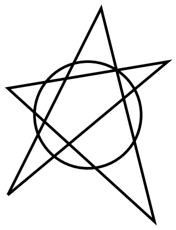

Figure 1. Here is a `demo.eps` to play with.

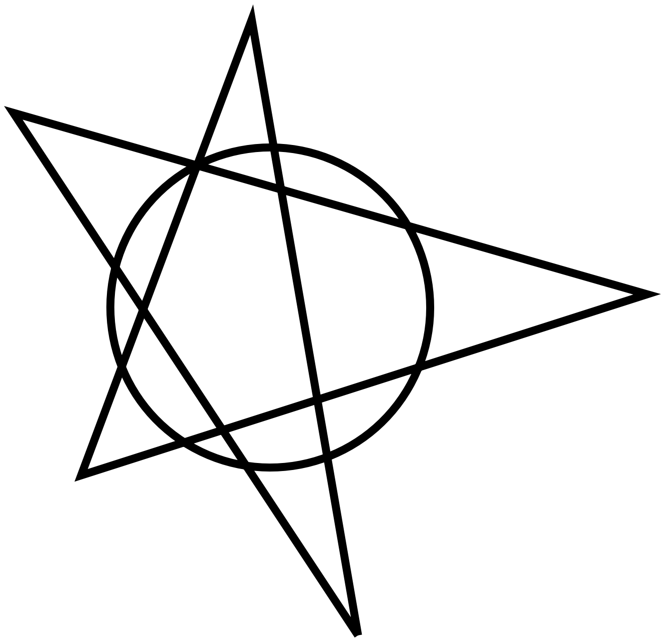

Figure 2. Here is `demo.eps` again rescaled to three times its original size and rotated counterclockwise through 60 degrees.

Figure 3 shows the default image with a different aspect ratio, created by varying the height and width with the command

```
\includegraphics[width = 400pt, height = 200pt]{demo}
```

In Figure 4 we plot the file `family demo2.eps`, which has a larger bounding box but using the default keys (`\includegraphics{demo2}`). We see that the relevant part of the figure has been forced down to the lower left of the figure in

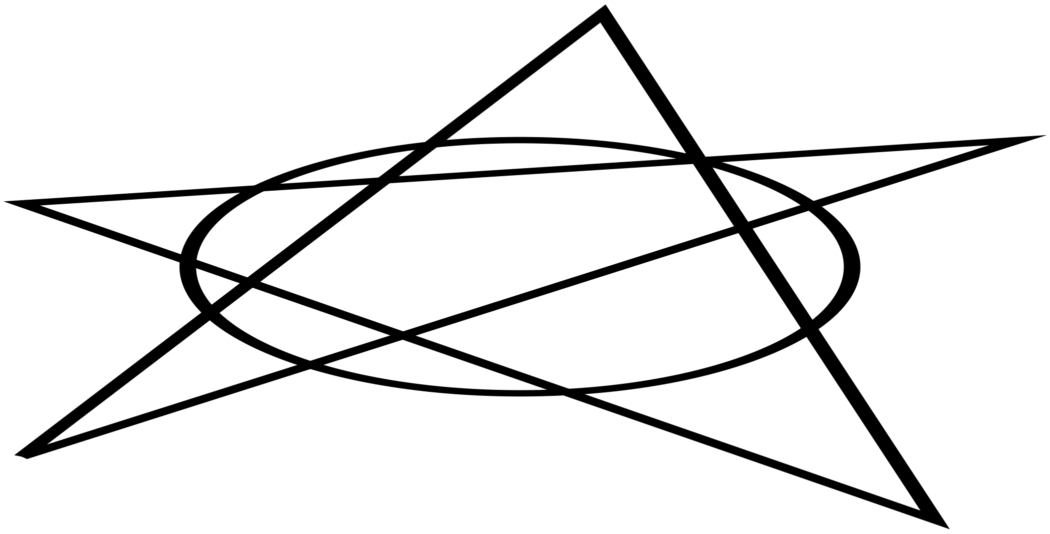

Figure 3. Here is `demo.eps` with a different aspect ratio.

spite of our efforts to center it. There are three ways of rectifying this situation. We can:

1. Force a new bounding box manually with the `bb` key (keying in the original coordinates)
2. Use the `viewport` key
3. Use the `trim` key

We can force a new bounding box by using:

```
\includegraphics[bb = 169 158 233 242]{demo2}
```

We have used the bounding box values for `demo.eps` for `demo.eps2`. The result is shown in Figure 5. We chose these values for the new bounding box because we already knew them from `demo.eps`; in practice we would need to experiment with various values in order to find something that works.

We get identical results if we use the command

```
\includegraphics[viewport = 0 0 64 84]{demo2.eps}
```

(see Figure 6) or

```
\includegraphics[trim = 0 0 300 300]{demo2.eps}
```

(see Figure 7). (Note that the key takes the bottom left corner of the existing bounding box as its origin.)

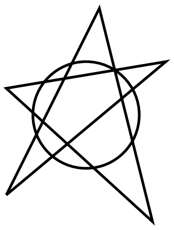

Figure 4. Here is `demo2.eps`, which is `demo.eps` with a different bounding box; this creates wide margins at the top and to the right of the original figure and causing the relevant part of the figure into the bottom left corner.

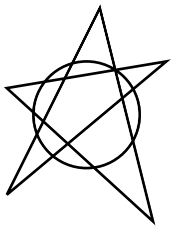

Figure 5. We set a new bounding box manually with the key `bb` to eliminate the unwanted margins and restore the figure to its central position.

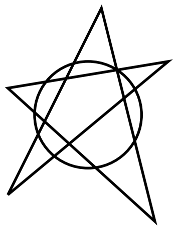

Figure 6. Elimination of unwanted margins using the `viewport` key (note that the origin, (0,0), is now the bottom left corner of the original bounding box.

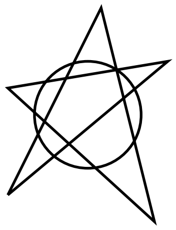

Figure 7. Elimination of unwanted margins using `trim` key.