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## MATLAB® Digest

# Exporting Figures for Publication: Part 2

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The article "Exporting Figures for Publication" in the June, 2000 MATLAB digest introduced the MATLAB function `exportfig.m` as a tool to help produce publication-quality output of figures and plots. The main goal of the function is to make it easier to control the size, the font sizes, the line widths and the color of the output. This article describes some of the features in a new version of `exportfig.m` and introduces three new functions `previewfig.m`, `applytofig.m` and `restorefig.m` to complement the functionality of `exportfig.m`. Download these files individually by clicking on the provided links and place the downloaded files on your MATLAB path.

The roles of these four functions are summarized in the table:

<a href="#">exportfig.m</a>	export the figure to a file
<a href="#">previewfig.m</a>	preview the figure
<a href="#">applytofig.m</a>	apply the export options directly to the figure
<a href="#">restorefig.m</a>	restore the figure to the original state

There are many new features in the `exportfig.m` family, but this article will focus on these four features:

- Tight bounding box
- Color-to-style mapping
- Preferences
- Separate text and bitmap output

Each of these features will be explained and illustrated with the plot created by executing the following MATLAB code:

```
x=0:.1:20;
y1=sin(x);
y2=cos(x);
plot(x,y1,x,y2);
legend('sin','cos');
axis([0 20 -2 2]);
grid on;
title('Plot of sin and cos');
xlabel('x');
```

Now resize the plot until it is a few inches in height and looks roughly like the illustration below:

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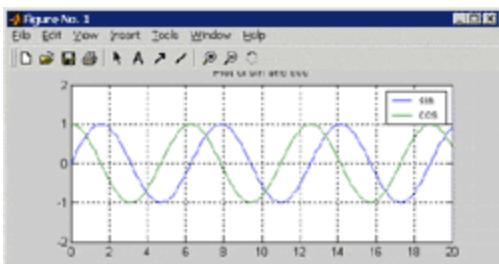
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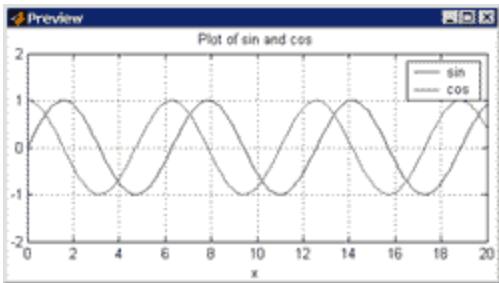
Notice how the title and x-label are cut off. One of the new features of the `exportfig` family is the "tight bounding box" option, which resizes the figure so that all the plots and labels fit perfectly inside the figure without any extra space around the edges, and without clipping any text objects. The command:

```
exportfig(gcf, 'test.eps', 'bounds', 'tight');
```

will export the figure with a tight bounding box to the file 'test.eps'. To create a preview of the figure as it would export with a tight bounding box type

```
previewfig(gcf, 'bounds', 'tight');
```

The preview will appear in a separate figure window which you should close after viewing. The preview should look like this:



*Click on image to see enlarged view*

To change the figure to have a tight bounding box type

```
oldstate = applytofig(gcf, 'bounds', 'tight');
```

and to restore the figure to its original state type

```
restorefig(gcf, oldstate);
```

The value returned by `applytofig` is a structure storing the figure's state as it existed before calling `applytofig`. If you make several changes to a figure using `applytofig` make sure you don't overwrite the original state structure, since the call to `restorefig` only restores the figure to the supplied state.

Another new feature in `exportfig.m` is the ability to map line colors to line styles, which is very useful when exporting a color plot to a black-and-white format. The command:

```
exportfig(gcf, 'test.eps', 'linestylemap', 'bw');
```

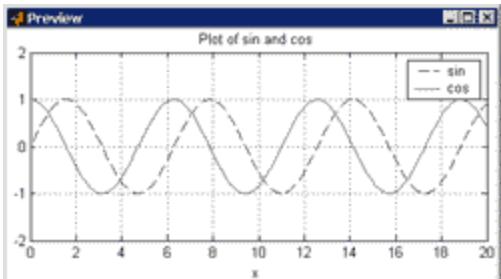
will export the current figure with all colored lines mapped to the four line styles using the default mapping. You can customize the algorithm used to perform the mapping by supplying the name of a function to evaluate. For example, the command:

```
exportfig(gcf, 'test.eps', 'linestylemap', 'mylinemap');
```

would execute the user function `mylinemap` instead of applying the default function. For our example figure the output of the command:

```
previewfig(gcf, 'bounds', 'tight', 'linestylemap', 'bw');
```

would look like:



*Click on image to see enlarged view*

Since it's tedious to have to type out all the options to `exportfig` every time, the new function allows you to collect those options into a structure and pass only the structure, or to set the options to be the default options. For example, type

```
opts = struct('bounds', 'tight', 'linestylemap', 'bw');
```

to create a structure with the field names 'bounds' and 'linestylemap' having the values 'tight' and 'bw', respectively. You can now type

```
previewfig(gcf, opts);
```

instead of

```
previewfig(gcf, 'bounds', 'tight', 'linestylemap', 'bw');
```

Also, if you type in R12

```
setpref('exportfig', 'defaults', opts);
```

then `opts` will be used as the default options for all of the `exportfig` functions and so you can simply type

```
previewfig(gcf);
```

The options specified in `setpref` are stored in your preferences file and will be automatically used in future MATLAB sessions.

The final new feature of `exportfig` is the ability to export bitmap images to one file and vector-format text to another file. In our example of plotting sin and cosine this feature is not needed since the entire plot can be rendered in a vector format. But some plots, like those involving transparency, can only be rendered in a bitmap format, and so the text would become pixelized and hard to read. The command:

```
exportfig(gcf, 'test.eps', 'separatetext', 1);
```

will create two files: `test.eps` and `test_t.eps`. The first file contains exactly what `exportfig` would normally produce except that all the text has been hidden. The second file contains only the text. You must overlay the two pictures in the destination document to obtain the true image. For example, to overlay two EPS files `test.eps` and `test_t.eps` that are 3 inches high you could use the TeX commands

```
\includegraphics{test.eps}
\skip -3in
\includegraphics{test_t.eps}
```

Using this technique the text is drawn at the printer's resolution and so it produces much higher quality images than could be produced using bitmaps alone.

These are only the most important new features of `exportfig` family. For more details about the capabilities of `exportfig.m`, type

```
help exportfig
```

to read the function's documentation.

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