The figureSeries package[*]

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Abstract

This package provides a first working version of a figure*-like construct, which can contain arbitrarily many sub-figures, (somewhat) float, and automatically break over multiple pages if necessary. The most current source code of this package can be found online at `http://github.com/thomasWeise/figureSeries`. Some discussions and additional information may be found at `http://www.it-weise.de`.

Contents

[*] This document corresponds to figureSeries v0.9.2, dated 2015/02/13.

1 Introduction

1.1 Addressed Problem and Use Case

LaTeX documents can contain floating objects such as figures or tables. “floating” here means that you insert a figure somewhere in your text and LaTeX will find the best place where to put it for you, a place where it fits nicely into the overall layout of the document. Sometimes it is desireable that a figure contains several sub-figures. Let’s say you want to group several diagrams which show related information and which all have the same structure.

In LaTeX, a floating object (composed of its contents and potentially a caption) can occupy at most one full page, meaning that it cannot contain any page break. This, in turn, means that the number of (or better the space for) sub-figures that can be hosted inside a figure is limited as well. But what if we have too many sub-figures? What it the sub-figures do not fit on one page, into one floating object, into one `\begin{figure}...\end{figure}`? (Again: The required space includes the space for the sub-figures themselves, their captions, the vertical space between rows of sub-figures, and the caption of the hosting figure.)

We can somewhat solve this issue by splitting the hosting figure into several separate figures, each containing a feasible amount of sub-figures. This needs to be done by hand, because we need to compile the document and fix and compile and fix and so on, since we usually not know beforehand how many sub-figures fit into one figure. This is not nice.

Problems may occur when our LaTeX document is created automatically and has an *a priori* unknown number of sub-figures in a figure. There is no way to automatically determine how many sub-figures we can place into a figure. Even if we would know the sub-figure sizes, we cannot compute the space occupied by their captions beforehand (well, without replicating LaTeX, that is. . .). Trust me, I have tried this (in the software project *TSPSuite* [1]). Similar use cases have been reported in [2, 3].

Also, LaTeX is limited in terms of the number of floating objects it can handle, I believe the limit is 18 and can be increased using the package `morefloats` [4], but this is a true problem when creating many sub-figures automatically. You may have so many sub-figures that splitting them into multiple (hosting) figures leads to too many (hosting) figures. Or you just end up with too many floating objects which are all laid out at once at the end of a chapter or something or which otherwise make your text layout look odd and unbalanced.

1.2 Provided Functionality

This package provides

1. a facility to include an arbitrary number of (potentially differently-sized) sub-figures into a figure*-like construct,

2. the ability to make this figure*-like construct look as if it was a floating object, which

3. works well in both single-column and double-column documents.

WARNING: This is just a first, hacked-together version of this package. I am not an expert in LaTeX, and I am pretty sure I managed to incorporate a few "that cannot be made to work reliable"s into the code. Plus, it contains some code taken from the internet, which I myself only partially understand (see Section 3.3.5). This package here is just there for discussion. Use it at your own risk.

2 Usage

2.1 Loading the Package

Load this package using

```
\RequirePackage{figureSeries}
```

This will automatically load the packages `caption` [5], `subcaption` [6], and `afterpage` [7].

2.2 Provided Macros

Here we discuss the macros that can directly be accessed by the user to make use of the package's functionality. The implementation of these macros is given in Section 3.2 and several examples can be found in Section 2.3.

`\figureSeriesElement` The macro `\figureSeriesElement{`⟨*caption*⟩`}{`⟨*contents*⟩`}` inserts an element of the figure series, i.e., one sub-figure. Its first argument is the caption of the element and may contain a `\label`. The second argument is the graphic to print. It could, e.g., be a call to `\includegraphic` from the `graphicx` package [8].

`\figureSeriesRow` `\figureSeriesElement{`⟨*contents*⟩`}` inserts a new row of elements (sub-figures) into the figure series. Its single argument should thus contain a sequence of `\figureSeriesElement`s. As a consequence of this architecture, each sub-figure belongs to one row and no sub-figure can span multiple rows.

`\figureSeriesHere` The macro `\figureSeriesHere{`⟨*caption*⟩`}{`⟨*contents*⟩`}` tries to insert a (non-floating) figure series at the current position in the document. This means that it may begin wherever, well, it is used, e.g., in the middle of the page.

The macro has two mandatory parameters, the caption and the contents. The caption will be be put at the beginning of the figure series, which is different from the normal behavior of captions in `\begin{figure*}...\end{figure*}` or `\begin{figure}...\end{figure}`. The reason is that a figure series may span over multiple pages and having the caption at the end may be awkward and confusing. The caption text may contain a `\label`.

The contents of a figure series should be a sequence of `\figureSeriesRow` calls.

Since figure series are page-wide elements, starting them in the middle of the page only works in single-column documents. In two-column documents, any figure series will behave as specified in macro `\figureSeriesFloat` below.

`\figureSeriesFloat` The macro `\figureSeriesFloat{`⟨*caption*⟩`}{`⟨*contents*⟩`}` macro takes the same parameters as `\figureSeriesHere`, but has a float-like behavior. By using the `\afterpage` command of `afterpage` package [7], we let it start at the following page. This is different from LaTeX’ normal floating behavior, but as good as we can get with page-breaking objects, I think.

2.3 Examples

Here we provide a set of examples for the use of the package. Each example demonstrates another facet of the package and, at the same time, serves as test case. Instead of using `\includegraphic`, we simply stretch single letters via `\resizebox` and use them “sub-figures”. This is good enough to see how the layout works and allows us to generate arbitrarily-sized placeholders for figures.

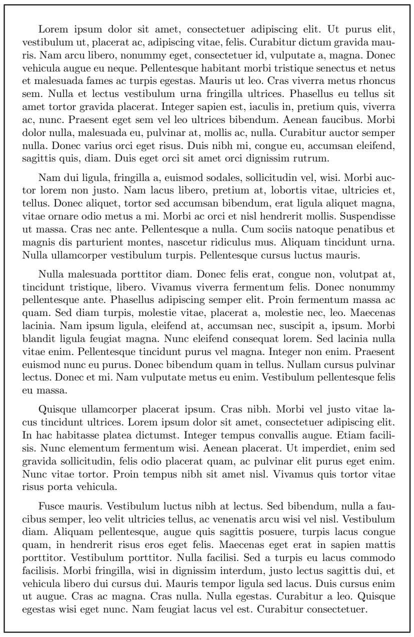
In order to create some placeholder text in the examples, we use the `lipsum` command from package `lipsum` [9], which prints pseudo-Latin text known as “Lorem Ipsum” (see `http://en.wikipedia.org/wiki/Lorem_ipsum`).

2.3.1 Non-Floating Figure Series in Single-Column Document

In Example 1 we place a non-floating figure series consisting of two rows of figures into a single-column document using Springer’s document class `llncs` [10]. The result can be seen in Figure 1 and compared with a floating version in Figure 7, which represents the floating version of this example (given in Example 7).

Example 1 An example using the single-column `llncs` class, rendered as Figure 1.

```
\documentclass{llncs}%
\RequirePackage{graphicx}%
\RequirePackage{lipsum}%
\RequirePackage{figureSeries}%
\begin{document}%
\lipsum%
\figureSeriesHere{%
My first figure series should appear somewhere in the text.%
}{%
\figureSeriesRow{%
\figureSeriesElement{Caption 1.1}{\resizebox{0.3\linewidth}{5cm}{\fbox{a}}}%
\figureSeriesElement{Caption 1.2}{\resizebox{0.3\linewidth}{5cm}{\fbox{b}}}%
\figureSeriesElement{Caption 1.3}{\resizebox{0.3\linewidth}{5cm}{\fbox{c}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 1.4}{\resizebox{0.3\linewidth}{5cm}{\fbox{d}}}%
\figureSeriesElement{Caption 1.5}{\resizebox{0.3\linewidth}{5cm}{\fbox{e}}}%
\figureSeriesElement{Caption 1.6}{\resizebox{0.3\linewidth}{5cm}{\fbox{f}}}%
}}%
\lipsum%
\end{document}%
```



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(1.1) Page 1 of the pdf compiled from Example 1.

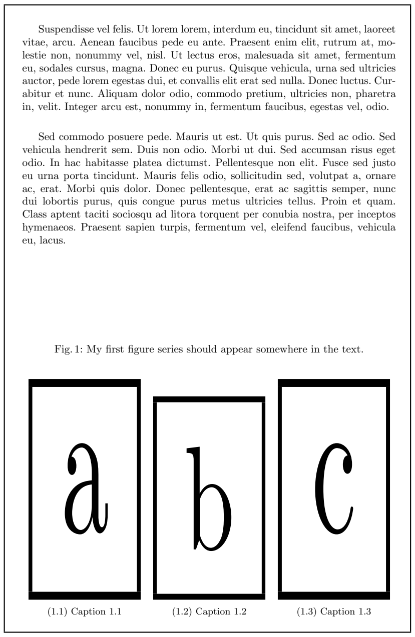

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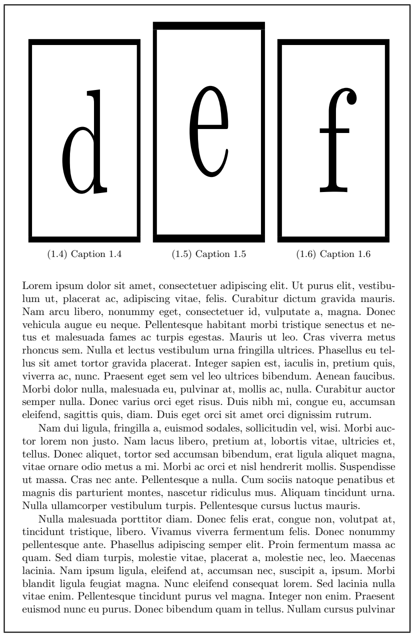
Fig. 1: My first figure series should appear somewhere in the text.

(1.1) Caption 1.1 (1.2) Caption 1.2 (1.3) Caption 1.3

(1.2) Page 2 of the pdf compiled from Example 1.



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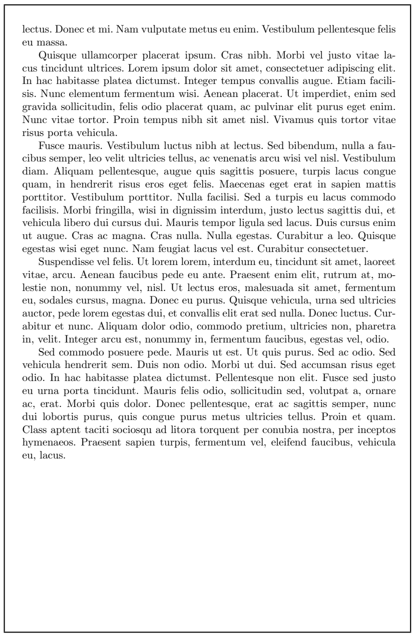

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(1.4) Page 4 of the pdf compiled from Example 1.

Figure 1: The rendered result of Example 1 (with trimmed page margins): A `figureSeries` starts at the bottom of a page and extends to the top of the next page.

2.3.2 Floating Figure Series in Double-Column Document

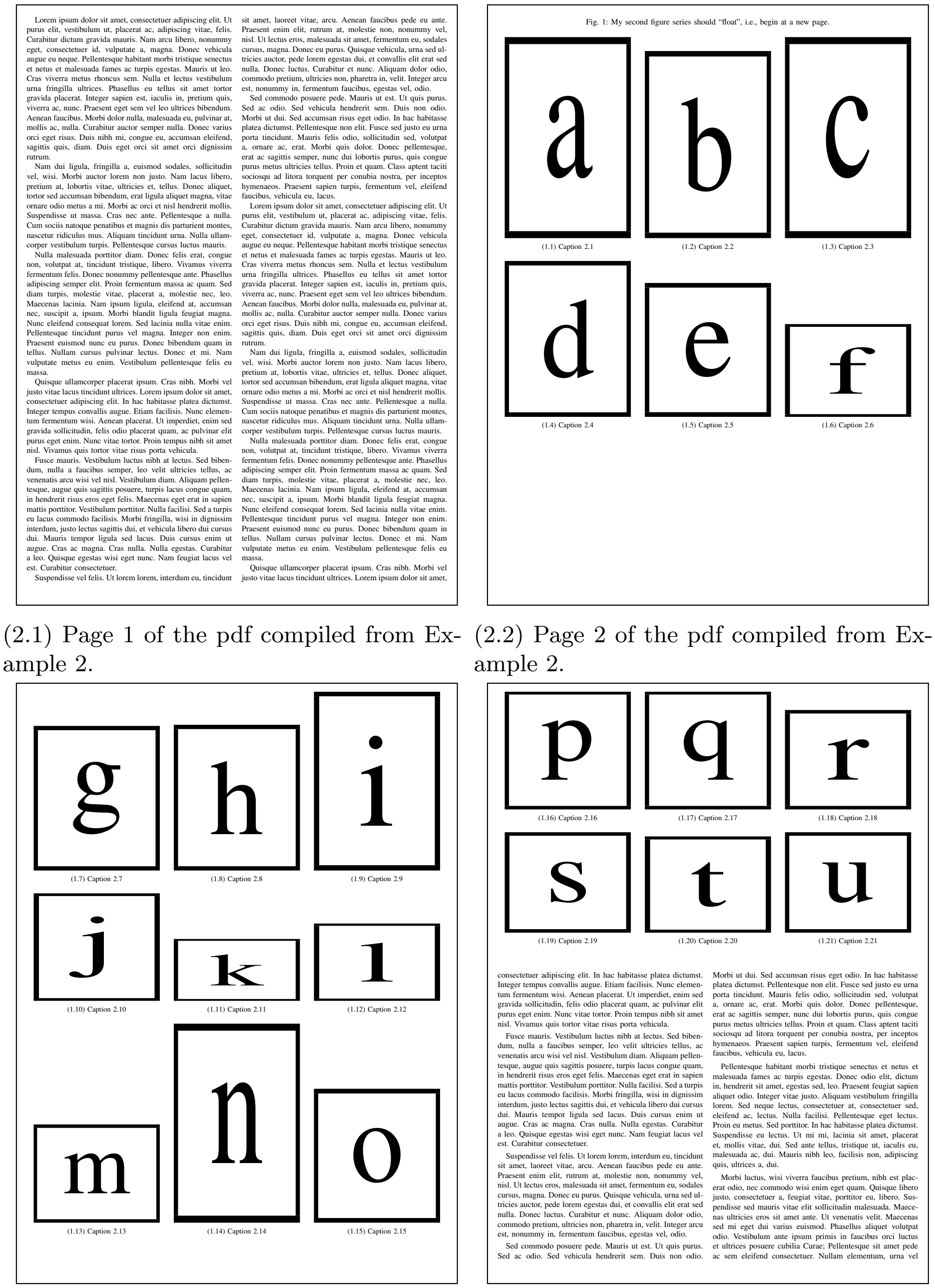
We now put a floating figure series into a double-column document using the `IEEEtran` [11] class in Example 2. This new figure series has five rows of sub-figures and should span over multiple pages. The two-column text continues directly after the figure series. The rendered results of this example are given in Figure 2.

2.3.3 Coalescing Figure Series in Double-Column Document

In Example 3, we put several floating figure series close to each other into a double-column document, again using the `IEEEtran` class [11]. The bodies of the figure series should coalesce without losing their captions, figure numbers, or identities. Since they coalesce, no empty pages are produced in between (see Section 3.3.4.F). The result is rendered as Figure 3.

Example 2 An example using the double-column `IEEEtrans` class, rendered as Figure 2.

```
\documentclass{IEEEtran}%
\RequirePackage{graphicx}%
\RequirePackage{lipsum}%
\RequirePackage{figureSeries}%
\begin{document}%
\lipsum%
\figureSeriesFloat{%
My second figure series should ‘‘float’’, i.e., begin at a new page.%
}{%
\figureSeriesRow{%
\figureSeriesElement{Caption 2.1}{\resizebox{0.3\linewidth}{6cm}{\fbox{a}}}%
\figureSeriesElement{Caption 2.2}{\resizebox{0.3\linewidth}{6cm}{\fbox{b}}}%
\figureSeriesElement{Caption 2.3}{\resizebox{0.3\linewidth}{6cm}{\fbox{c}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 2.4}{\resizebox{0.3\linewidth}{5cm}{\fbox{d}}}%
\figureSeriesElement{Caption 2.5}{\resizebox{0.3\linewidth}{4cm}{\fbox{e}}}%
\figureSeriesElement{Caption 2.6}{\resizebox{0.3\linewidth}{3cm}{\fbox{f}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 2.7}{\resizebox{0.3\linewidth}{!}{\fbox{g}}}%
\figureSeriesElement{Caption 2.8}{\resizebox{0.3\linewidth}{!}{\fbox{h}}}%
\figureSeriesElement{Caption 2.9}{\resizebox{0.3\linewidth}{!}{\fbox{i}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 2.10}{\resizebox{0.3\linewidth}{3cm}{\fbox{j}}}%
\figureSeriesElement{Caption 2.11}{\resizebox{0.3\linewidth}{2cm}{\fbox{k}}}%
\figureSeriesElement{Caption 2.12}{\resizebox{0.3\linewidth}{2.5cm}{\fbox{l}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 2.13}{\resizebox{0.3\linewidth}{!}{\fbox{m}}}%
\figureSeriesElement{Caption 2.14}{\resizebox{0.3\linewidth}{6cm}{\fbox{n}}}%
\figureSeriesElement{Caption 2.15}{\resizebox{0.3\linewidth}{4cm}{\fbox{o}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 2.16}{\resizebox{0.3\linewidth}{3cm}{\fbox{p}}}%
\figureSeriesElement{Caption 2.17}{\resizebox{0.3\linewidth}{3cm}{\fbox{q}}}%
\figureSeriesElement{Caption 2.18}{\resizebox{0.3\linewidth}{3cm}{\fbox{r}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 2.19}{\resizebox{0.3\linewidth}{3cm}{\fbox{s}}}%
\figureSeriesElement{Caption 2.20}{\resizebox{0.3\linewidth}{3cm}{\fbox{t}}}%
\figureSeriesElement{Caption 2.21}{\resizebox{0.3\linewidth}{3cm}{\fbox{u}}}%
}}%
\lipsum[1-20]%
\end{document}%
```



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(2.1) Page 1 of the pdf compiled from Example 2.

Fig. 1: My second figure series should "float", i.e., begin at a new page.

(1.1) Caption 2.1 (1.2) Caption 2.2 (1.3) Caption 2.3

(1.4) Caption 2.4 (1.5) Caption 2.5 (1.6) Caption 2.6

(2.2) Page 2 of the pdf compiled from Example 2.

(1.7) Caption 2.7 (1.8) Caption 2.8 (1.9) Caption 2.9

(1.10) Caption 2.10 (1.11) Caption 2.11 (1.12) Caption 2.12

(1.13) Caption 2.13 (1.14) Caption 2.14 (1.15) Caption 2.15

(2.3) Page 3 of the pdf compiled from Example 2.

(1.16) Caption 2.16 (1.17) Caption 2.17 (1.18) Caption 2.18

(1.19) Caption 2.19 (1.20) Caption 2.20 (1.21) Caption 2.21

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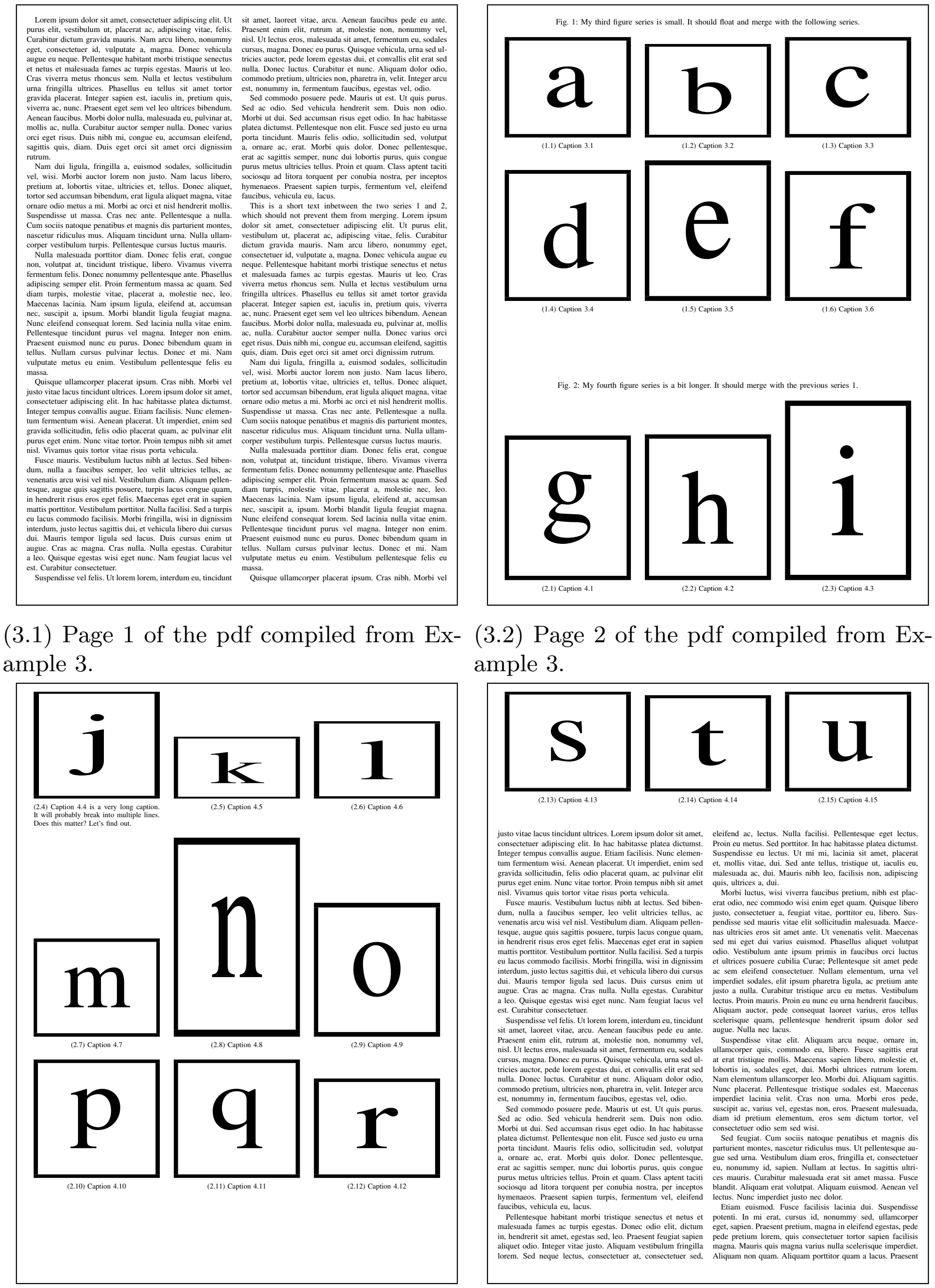
(2.4) Page 4 of the pdf compiled from Example 2.

Figure 2: The rendered result of Example 2 (with trimmed page margins): A floating `figureSeries` in double-column mode.

Example 3 An example using the double-column `IEEEtrans` class and two coalescing figure series, rendered as Figure 3.

```
\documentclass{IEEEtran}%
\RequirePackage{graphicx}%
\RequirePackage{lipsum}%
\RequirePackage{figureSeries}%
\begin{document}%
\lipsum%
\figureSeriesFloat{%
My third figure series is small. It should float and merge with the following
series.\label{ser:3}%
}{%
\figureSeriesRow{%
\figureSeriesElement{Caption 3.1}{\resizebox{0.3\linewidth}{3cm}{\fbox{a}}}%
\figureSeriesElement{Caption 3.2}{\resizebox{0.3\linewidth}{3cm}{\fbox{b}}}%
\figureSeriesElement{Caption 3.3}{\resizebox{0.3\linewidth}{3cm}{\fbox{c}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 3.4}{\resizebox{0.3\linewidth}{4.2cm}{\fbox{d}}}%
\figureSeriesElement{Caption 3.5}{\resizebox{0.3\linewidth}{4.2cm}{\fbox{e}}}%
\figureSeriesElement{Caption 3.6}{\resizebox{0.3\linewidth}{4.2cm}{\fbox{f}}}%
}}%
This is a short text inbetween the two series~\ref{ser:3} and~\ref{ser:4},
which should not prevent them from merging.
\figureSeriesFloat{%
My fourth figure series is a bit longer. It should merge with the previous
series~\ref{ser:3}.\label{ser:4}%
}{
\figureSeriesRow{%
\figureSeriesElement{Caption 4.1}{\resizebox{0.3\linewidth}{!}{\fbox{g}}}%
\figureSeriesElement{Caption 4.2}{\resizebox{0.3\linewidth}{!}{\fbox{h}}}%
\figureSeriesElement{Caption 4.3}{\resizebox{0.3\linewidth}{!}{\fbox{i}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 4.4 is a very long caption. It will probably %
break into multiple lines. Does this matter? Let's find out.}{%
\resizebox{0.3\linewidth}{3cm}{\fbox{j}}}%
\figureSeriesElement{Caption 4.5}{\resizebox{0.3\linewidth}{2cm}{\fbox{k}}}%
\figureSeriesElement{Caption 4.6}{\resizebox{0.3\linewidth}{2.5cm}{\fbox{l}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 4.7}{\resizebox{0.3\linewidth}{!}{\fbox{m}}}%
\figureSeriesElement{Caption 4.8}{\resizebox{0.3\linewidth}{6cm}{\fbox{n}}}%
\figureSeriesElement{Caption 4.9}{\resizebox{0.3\linewidth}{4cm}{\fbox{o}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 4.10}{\resizebox{0.3\linewidth}{3cm}{\fbox{p}}}%
\figureSeriesElement{Caption 4.11}{\resizebox{0.3\linewidth}{3cm}{\fbox{q}}}%
\figureSeriesElement{Caption 4.12}{\resizebox{0.3\linewidth}{3cm}{\fbox{r}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 4.13}{\resizebox{0.3\linewidth}{3cm}{\fbox{s}}}%
\figureSeriesElement{Caption 4.14}{\resizebox{0.3\linewidth}{3cm}{\fbox{t}}}%
\figureSeriesElement{Caption 4.15}{\resizebox{0.3\linewidth}{3cm}{\fbox{u}}}%
}}%
\lipsum[1-20]%
\end{document}%
```



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(3.1) Page 1 of the pdf compiled from Example 3.

Fig. 1: My third figure series is small. It should float and merge with the following series.

(1.1) Caption 3.1

(1.2) Caption 3.2

(1.3) Caption 3.3

(1.4) Caption 3.4

(1.5) Caption 3.5

(1.6) Caption 3.6

Fig. 2: My fourth figure series is a bit longer. It should merge with the previous series 1.

(2.1) Caption 4.1

(2.2) Caption 4.2

(2.3) Caption 4.3

(3.2) Page 2 of the pdf compiled from Example 3.

(2.4) Caption 4.4 is a very long caption. It will probably break into multiple lines. Does this matter? Let's find out.

(2.5) Caption 4.5

(2.6) Caption 4.6

(2.7) Caption 4.7

(2.8) Caption 4.8

(2.9) Caption 4.9

(2.10) Caption 4.10

(2.11) Caption 4.11

(2.12) Caption 4.12

(3.3) Page 3 of the pdf compiled from Example 3.

(2.13) Caption 4.13

(2.14) Caption 4.14

(2.15) Caption 4.15

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Etiam euismod. Fusce facilisis lacinia dui. Suspendisse potenti. In mi erat, cursus id, nonummy sed, ullamcorper eget, sapien. Praesent pretium, magna in eleifend egestas, pede pede pretium lorem, quis consectetuer tortor sapien facilisis magna. Mauris quis magna varius nulla scelerisque imperdiet. Aliquam non quam. Aliquam porttitor quam a lacus. Praesent

(3.4) Page 4 of the pdf compiled from Example 3.

Figure 3: The rendered result of Example 3 (with trimmed page margins): Two floating `figureSeries` in double-column mode are coalesced, without using their caption and identies.

2.3.4 Double-Column Document with `sig-alternate`

In the following Example 4, we test the `figureSeries` together for documents using ACM's `sig-alternate` [12] document class.

2.3.5 Many Small Sub-Figures in Double-Column Document

In the following Example 5 (again based on ACM's `sig-alternate` [12] document class), we put many small sub-figures into a figure. Also, the last paragraph of the text in the example is a reference to one of the sub-figures. The results are rendered as Figure 5.

2.3.6 Two `figureSeries` Separated by Text in Double-Column Document

In the following Example 6 (again based on ACM's `sig-alternate` [12] document class), we put two `figureSeries` which are separated by text. The results are rendered as Figure 6.

2.3.7 One Floating `figureSeries` in a Single-Column Document

In the following Example 7 (based on Springer's `llncs` [10] document class), we let the figure series from Example 1 float. You can compare the rendered in Figure 7 with those in Figure 1.

Example 4 An example featuring the double-column `sig-alternate` class. The results are rendered as Figure 4.

```
\documentclass{sig-alternate}
\RequirePackage{graphicx}%
\RequirePackage{lipsum}%
\RequirePackage{figureSeries}%
\begin{document}%
\lipsum[1]%
\figureSeriesFloat{%
My fifth figure series should ‘‘float’’, i.e., begin at a new page. It
also shows that the vertical offsets of the columns following it do not fit
well if we use the \texttt{sig-alternate} class.%
}{%
\figureSeriesRow{%
\figureSeriesElement{Caption 5.1}{\resizebox{0.3\linewidth}{6cm}{\fbox{a}}}%
\figureSeriesElement{Caption 5.2}{\resizebox{0.3\linewidth}{6cm}{\fbox{b}}}%
\figureSeriesElement{Caption 5.3}{\resizebox{0.3\linewidth}{6cm}{\fbox{c}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 5.4}{\resizebox{0.3\linewidth}{5cm}{\fbox{d}}}%
\figureSeriesElement{Caption 5.5}{\resizebox{0.3\linewidth}{4cm}{\fbox{e}}}%
\figureSeriesElement{Caption 5.6}{\resizebox{0.3\linewidth}{3cm}{\fbox{f}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 5.7}{\resizebox{0.3\linewidth}{!}{\fbox{g}}}%
\figureSeriesElement{Caption 5.8}{\resizebox{0.3\linewidth}{!}{\fbox{h}}}%
\figureSeriesElement{Caption 5.9}{\resizebox{0.3\linewidth}{!}{\fbox{i}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 5.10}{\resizebox{0.3\linewidth}{3cm}{\fbox{j}}}%
\figureSeriesElement{Caption 5.11}{\resizebox{0.3\linewidth}{2cm}{\fbox{k}}}%
\figureSeriesElement{Caption 5.12}{\resizebox{0.3\linewidth}{5.5cm}{\fbox{l}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 5.13}{\resizebox{0.3\linewidth}{!}{\fbox{m}}}%
\figureSeriesElement{Caption 5.14}{\resizebox{0.3\linewidth}{6cm}{\fbox{n}}}%
\figureSeriesElement{Caption 5.15}{\resizebox{0.3\linewidth}{4cm}{\fbox{o}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 5.16}{\resizebox{0.3\linewidth}{3cm}{\fbox{p}}}%
\figureSeriesElement{Caption 5.17}{\resizebox{0.3\linewidth}{3cm}{\fbox{q}}}%
\figureSeriesElement{Caption 5.18}{\resizebox{0.3\linewidth}{3cm}{\fbox{r}}}%
}}%
\lipsum[1-20]%
\end{document}%
```

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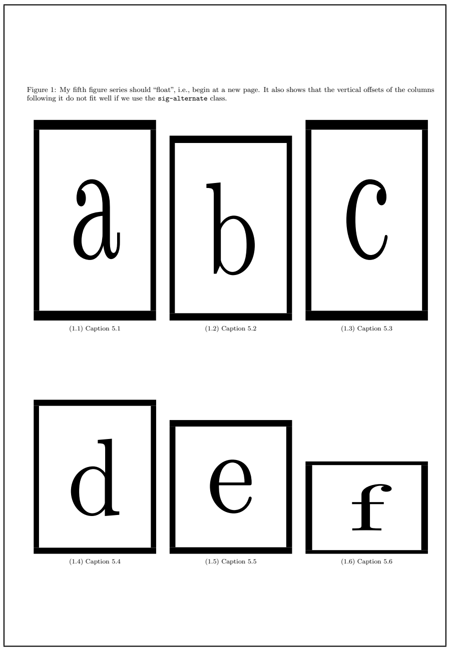


Figure 1: My fifth figure series should "float", i.e., begin at a new page. It also shows that the vertical offsets of the columns following it do not fit well if we use the `sig-alternate` class.

(1.1) Caption 5.1

(1.2) Caption 5.2

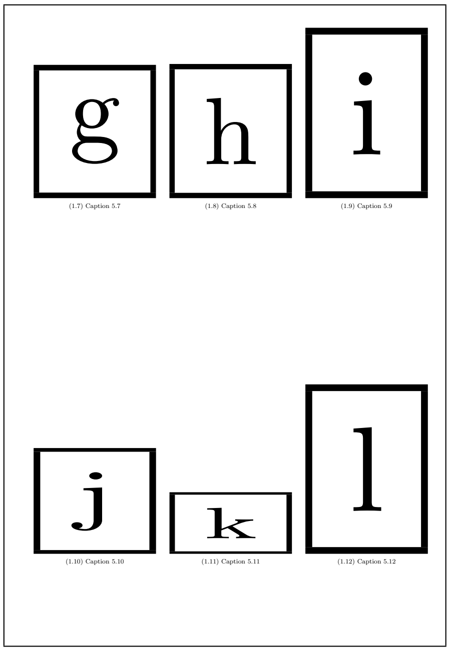
(1.3) Caption 5.3

(1.4) Caption 5.4

(1.5) Caption 5.5

(1.6) Caption 5.6

(4.2) Page 2 of the pdf compiled from Example 4.



(1.7) Caption 5.7

(1.8) Caption 5.8

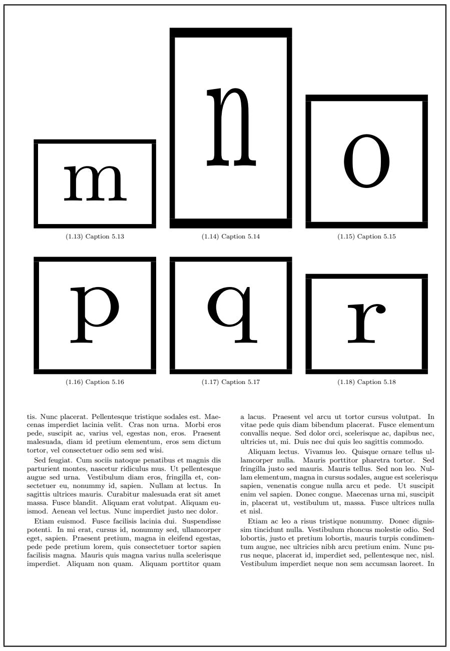
(1.9) Caption 5.9

(1.10) Caption 5.10

(1.11) Caption 5.11

(1.12) Caption 5.12

(4.3) Page 3 of the pdf compiled from Example 4.



(1.13) Caption 5.13

(1.14) Caption 5.14

(1.15) Caption 5.15

(1.16) Caption 5.16

(1.17) Caption 5.17

(1.18) Caption 5.18

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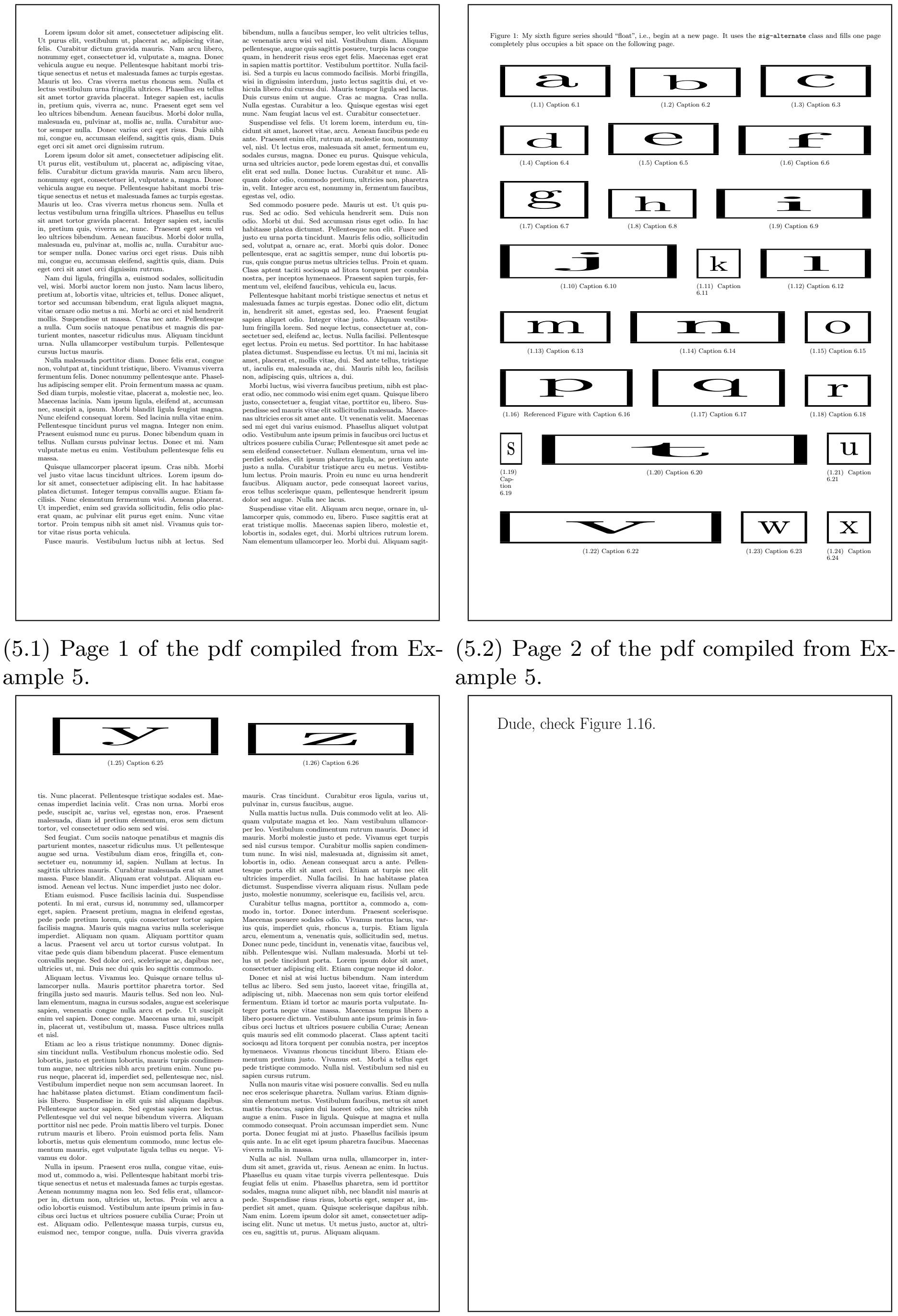
(4.4) Page 4 of the pdf compiled from Example 4.

Figure 4: The rendered result of Example 4 (with trimmed page margins): It works for `sig-alternate` too.

Example 5 An example featuring the double-column `sig-alternate` class with a reference to sub-figure. The results are rendered as Figure 5.

```
\documentclass{sig-alternate}
\RequirePackage{graphicx}%
\RequirePackage{lipsum}%
\RequirePackage{figureSeries}%
\begin{document}%
\lipsum[1]%
\figureSeriesFloat{%
My sixth figure series should ``float'', i.e., begin at a new page.
It uses the \texttt{sig-alternate} class and fills one page completely
plus occupies a bit space on the following page.%
}{%
\figureSeriesRow{%
\figureSeriesElement{Caption 6.1}{\resizebox{5cm}{1cm}{\fbox{a}}}%
\figureSeriesElement{Caption 6.2}{\resizebox{5cm}{1cm}{\fbox{b}}}%
\figureSeriesElement{Caption 6.3}{\resizebox{5cm}{1cm}{\fbox{c}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 6.4}{\resizebox{4cm}{1cm}{\fbox{d}}}%
\figureSeriesElement{Caption 6.5}{\resizebox{5cm}{1cm}{\fbox{e}}}%
\figureSeriesElement{Caption 6.6}{\resizebox{6cm}{1cm}{\fbox{f}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 6.7}{\resizebox{4cm}{1cm}{\fbox{g}}}%
\figureSeriesElement{Caption 6.8}{\resizebox{4cm}{1cm}{\fbox{h}}}%
\figureSeriesElement{Caption 6.9}{\resizebox{7cm}{1cm}{\fbox{i}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 6.10}{\resizebox{8cm}{1cm}{\fbox{j}}}%
\figureSeriesElement{Caption 6.11}{\resizebox{2cm}{1cm}{\fbox{k}}}%
\figureSeriesElement{Caption 6.12}{\resizebox{5cm}{1cm}{\fbox{l}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 6.13}{\resizebox{5cm}{1cm}{\fbox{m}}}%
\figureSeriesElement{Caption 6.14}{\resizebox{7cm}{1cm}{\fbox{n}}}%
\figureSeriesElement{Caption 6.15}{\resizebox{3cm}{1cm}{\fbox{o}}}%
}\figureSeriesRow{%
\figureSeriesElement{\label{checkThis}Referenced Figure with Caption 6.16}{\resizebox{6cm}{1cm}{\
\figureSeriesElement{Caption 6.17}{\resizebox{6cm}{1cm}{\fbox{q}}}%
\figureSeriesElement{Caption 6.18}{\resizebox{3cm}{1cm}{\fbox{r}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 6.19}{\resizebox{1cm}{1cm}{\fbox{s}}}%
\figureSeriesElement{Caption 6.20}{\resizebox{12cm}{1cm}{\fbox{t}}}%
\figureSeriesElement{Caption 6.21}{\resizebox{2cm}{1cm}{\fbox{u}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 6.22}{\resizebox{10cm}{1cm}{\fbox{v}}}%
\figureSeriesElement{Caption 6.23}{\resizebox{3cm}{1cm}{\fbox{w}}}%
\figureSeriesElement{Caption 6.24}{\resizebox{2cm}{1cm}{\fbox{x}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 6.25}{\resizebox{7.5cm}{1cm}{\fbox{y}}}%
\figureSeriesElement{Caption 6.26}{\resizebox{7.5cm}{1cm}{\fbox{z}}}%
}}%
\lipsum[1-20]\par%
\huge{Dude, check Figure~\ref{checkThis}.}%
\end{document}%
```



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(5.1) Page 1 of the pdf compiled from Example 5.

Figure 1: My sixth figure series should “float”, i.e., begin at a new page. It uses the `sig-alternate` class and fills one page completely plus occupies a bit space on the following page.

(1.1) Caption 6.1 (1.2) Caption 6.2 (1.3) Caption 6.3

(1.4) Caption 6.4 (1.5) Caption 6.5 (1.6) Caption 6.6

(1.7) Caption 6.7 (1.8) Caption 6.8 (1.9) Caption 6.9

(1.10) Caption 6.10 (1.11) Caption 6.11 (1.12) Caption 6.12

(1.13) Caption 6.13 (1.14) Caption 6.14 (1.15) Caption 6.15

(1.16) Referenced Figure with Caption 6.16 (1.17) Caption 6.17 (1.18) Caption 6.18

(1.19) Caption 6.19 (1.20) Caption 6.20 (1.21) Caption 6.21

(1.22) Caption 6.22 (1.23) Caption 6.23 (1.24) Caption 6.24

(5.2) Page 2 of the pdf compiled from Example 5.

(1.25) Caption 6.25 (1.26) Caption 6.26

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(5.3) Page 3 of the pdf compiled from Example 5.

Dude, check Figure 1.16.

(5.4) Page 4 of the pdf compiled from Example 5.

Figure 5: The rendered result of Example 5 (with trimmed page margins): Many small sub-figures nicely fill a page.

Example 6 An example featuring two figure series separated by text. The results are rendered as Figure 6.

```
\documentclass{sig-alternate}
\RequirePackage{graphicx}%
\RequirePackage{lipsum}%
\RequirePackage{figureSeries}%
\begin{document}%
\lipsum[1]%
\figureSeriesFloat{%
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}{%
\figureSeriesRow{%
\figureSeriesElement{Caption 7.1}{\resizebox{5cm}{3cm}{\fbox{a}}}%
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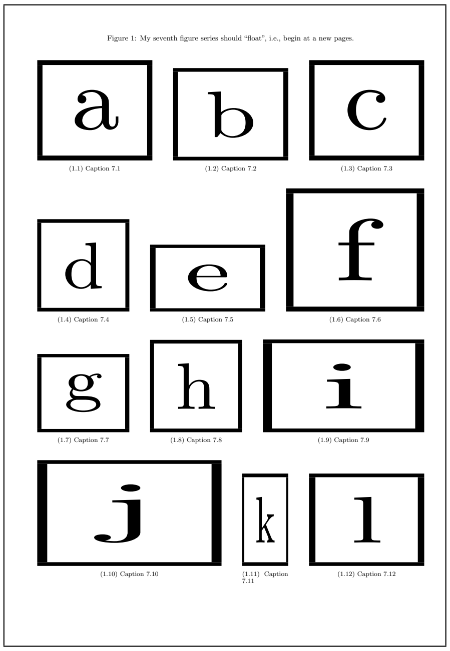

Figure 1: My seventh figure series should “float”, i.e., begin at a new pages.

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(1.6) Caption 7.6

(1.7) Caption 7.7

(1.8) Caption 7.8

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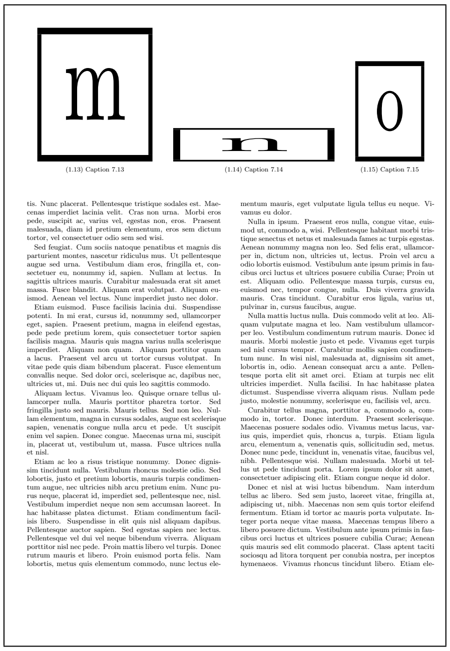
(1.10) Caption 7.10

(1.11) Caption 7.11

(1.12) Caption 7.12

(6.1) Page 2 of the pdf compiled from Example 6.



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(6.2) Page 3 of the pdf compiled from Example 6.

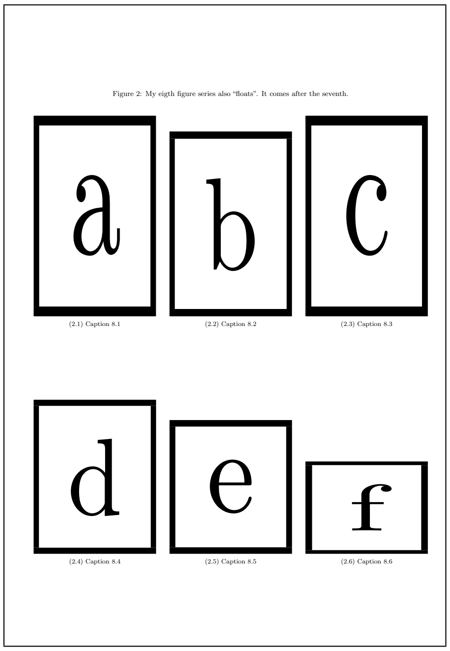


Figure 2: My eigth figure series also “floats”. It comes after the seventh.

(2.1) Caption 8.1

(2.2) Caption 8.2

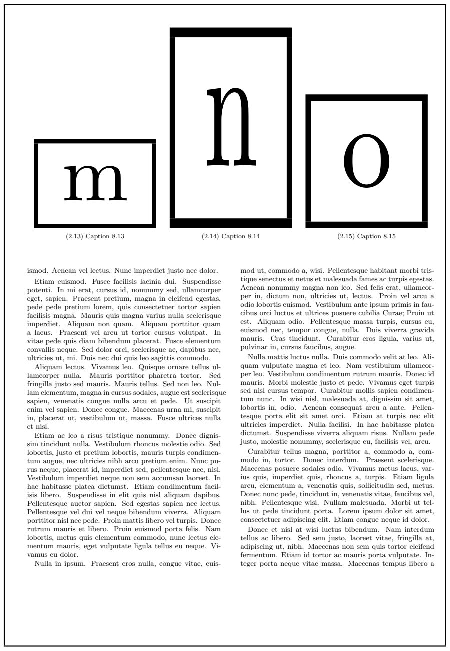
(2.3) Caption 8.3

(2.4) Caption 8.4

(2.5) Caption 8.5

(2.6) Caption 8.6

(6.3) Page 6 of the pdf compiled from Example 6.



(2.13) Caption 8.13

(2.14) Caption 8.14

(2.15) Caption 8.15

ismod. Aenean vel lectus. Nunc imperdiet justo nec dolor.

Etiam euismod. Fusce facilisis lacinia dui. Suspendisse potenti. In mi erat, cursus id, nonummy sed, ullamcorper eget, sapien. Praesent pretium, magna in eleifend egestas, pede pede pretium lorem, quis consectetuer tortor sapien facilisis magna. Mauris quis magna varius nulla scelerisque imperdiet. Aliquam non quam. Aliquam porttitor quam a lacus. Praesent vel arcu ut tortor cursus volutpat. In vitae pede quis diam bibendum placerat. Fusce elementum convallis neque. Sed dolor orci, scelerisque ac, dapibus nec, ultricies ut, mi. Duis nec dui quis leo sagittis commodo.

Aliquam lectus. Vivamus leo. Quisque ornare tellus ullamcorper nulla. Mauris porttitor pharetra tortor. Sed fringilla justo sed mauris. Mauris tellus. Sed non leo. Nullam elementum, magna in cursus sodales, augue est scelerisque sapien, venenatis congue nulla arcu et pede. Ut suscipit enim vel sapien. Donec congue. Maecenas urna mi, suscipit in, placerat ut, vestibulum ut, massa. Fusce ultrices nulla et nisl.

Etiam ac leo a risus tristique nonummy. Donec dignissim tincidunt nulla. Vestibulum rhoncus molestie odio. Sed lobortis, justo et pretium lobortis, mauris turpis condimentum augue, nec ultricies nibh arcu pretium enim. Nunc purus neque, placerat id, imperdiet sed, pellentesque nec, nisl. Vestibulum imperdiet neque non sem accumsan laoreet. In hac habitasse platea dictumst. Etiam condimentum facilisis libero. Suspendisse in elit quis nisl aliquam dapibus. Pellentesque auctor sapien. Sed egestas sapien nec lectus. Pellentesque vel dui vel neque bibendum viverra. Aliquam porttitor nisl nec pede. Proin mattis libero vel turpis. Donec rutrum mauris et libero. Proin euismod porta felis. Nam lobortis, metus quis elementum commodo, nunc lectus elementum mauris, eget vulputate ligula tellus eu neque. Vivamus eu dolor.

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Nulla mattis luctus nulla. Duis commodo velit at leo. Aliquam vulputate magna et leo. Nam vestibulum ullamcorper leo. Vestibulum condimentum rutrum mauris. Donec id mauris. Morbi molestie justo et pede. Vivamus eget turpis sed nisl cursus tempor. Curabitur mollis sapien condimentum nunc. In wisi nisl, malesuada at, dignissim sit amet, lobortis in, odio. Aenean consequat arcu a ante. Pellentesque porta elit sit amet orci. Etiam at turpis nec elit ultricies imperdiet. Nulla facilisi. In hac habitasse platea dictumst. Suspendisse viverra aliquam risus. Nullam pede justo, molestie nonummy, scelerisque eu, facilisis vel, arcu.

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(6.4) Page 8 of the pdf compiled from Example 6.

Figure 6: The rendered result of Example 6 (with trimmed page margins): Two `figureSeries` are separated by text.

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(7.1) Page 1 of the pdf compiled from Example 7.

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(7.2) Page 2 of the pdf compiled from Example 7.

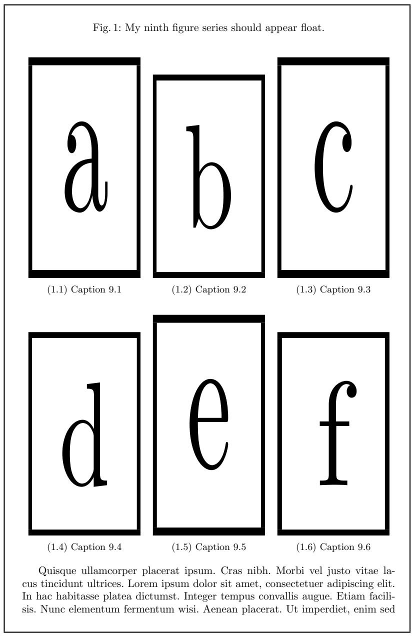

Fig. 1: My ninth figure series should appear float.

(1.1) Caption 9.1 (1.2) Caption 9.2 (1.3) Caption 9.3

(1.4) Caption 9.4 (1.5) Caption 9.5 (1.6) Caption 9.6

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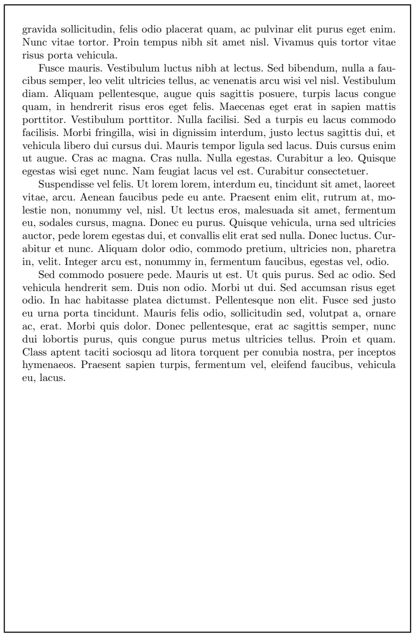
(7.3) Page 3 of the pdf compiled from Example 7.



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(7.4) Page 4 of the pdf compiled from Example 7.

Figure 7: The rendered result of Example 7 (with trimmed page margins): A `figureSeries` floating in single-column mode (see Example 1 for the non-floating version).

Example 7 An example using the single-column `llncs` class, rendered as Figure 7.

```
\documentclass{llncs}%
\RequirePackage{graphicx}%
\RequirePackage{lipsum}%
\RequirePackage{figureSeries}%
\begin{document}%
\lipsum%
\figureSeriesFloat{%
My ninth figure series should appear float.%
}{%
\figureSeriesRow{%
\figureSeriesElement{Caption 9.1}{\resizebox{0.3\linewidth}{5cm}{\fbox{a}}}%
\figureSeriesElement{Caption 9.2}{\resizebox{0.3\linewidth}{5cm}{\fbox{b}}}%
\figureSeriesElement{Caption 9.3}{\resizebox{0.3\linewidth}{5cm}{\fbox{c}}}%
}\figureSeriesRow{%
\figureSeriesElement{Caption 9.4}{\resizebox{0.3\linewidth}{5cm}{\fbox{d}}}%
\figureSeriesElement{Caption 9.5}{\resizebox{0.3\linewidth}{5cm}{\fbox{e}}}%
\figureSeriesElement{Caption 9.6}{\resizebox{0.3\linewidth}{5cm}{\fbox{f}}}%
}}%
\lipsum%
\end{document}%
```

3 Implementation

The names of all macros for public use are prefixed with `figureSeries`. The names of all internal elements of the package are prefixed with `@figSer@`. This naming convention should prevent any name clashes with other packages.

3.1 Loading of Required Packages

Our `figureSeries` package requires three other packages:

1. The package `caption` [5] for the caption of the `figureSeries`.
2. The package `subcaption` [6] for sub-figure layout and captions.
3. The package `afterpage` [7] for creating the impression that our `figureSeries` can float.

3.1.1 Loading `caption` and `subcaption`

We rely on the packages `caption` and `subcaption` to render the `figureSeries`' and sub-figure's captions. However, Springer's `llncs.cls` [10] seems to be incompatible with the `subcaption` package [6][1]. Yet, we need that package for giving nice captions to the sub-figures. Therefore, we load the `caption` package [5] with option `compatibility=false` (which can solve this issue) if necessary. This is behavior governed by the Boolean flag `@figSer@captionCompatibilityFalse`, initialized to `false`.

```
\newif\if@figSer@captionCompatibilityFalse%
\@figSer@captionCompatibilityFalsefalse%
```

After the flag has been allocated and set to `false`, we check for Springer's `llncs.cls` (in a crude way). In case of `llncs.cls`, if we do not set the option `compatibility` of the `caption` package to `false`, we will get the error *! Package caption Error: The 'subcaption' package does not work correctly in compatibility mode.*

```
\ifx\spnewtheorem\@undefined%
\else%
\@figSer@captionCompatibilityFalsetrue%
\fi%
```

Now we can load the `caption` [5] package with the right "`compatibility`" setting.

```
\if@figSer@captionCompatibilityFalse%
\RequirePackage[compatibility=false]{caption}%
\else%
\RequirePackage{caption}%
\fi%
```

[1] According to `http://www.michaelshell.org/tex/ieeetran/`, IEEE's `IEEEtrans.cls` [11] may also be incompatible, but it seems to works here.

We now load the `subcaption` package [6] and set the caption style for sub-figures to arabic. The reason is that we may have many sub-figures, too many for indexes ranging only from *a)* to *z)*. By using arabic numbers, we are on the safe side.

```
\RequirePackage{subcaption}%
\DeclareCaptionSubType*[arabic]{figure}%
```

3.1.2 Loading the `afterpage` Package

Floating objects cannot break across pages, so we cannot really make our figure series float. However, by using the afterpage package, we can make it look as if it was floating by rendering it on the next page.

```
\RequirePackage{afterpage}%
```

3.2 User Interface Macros

This section contains the macros which the package user can/should access, i.e., those macros which have been shortly discussed in Section 2.2.

`\figureSeriesElement`

The macro `\figureSeriesElement{`⟨*caption*⟩`}{`⟨*contents*⟩`}` inserts an element of the figure series, i.e., one sub-figure. Its first argument is the caption of the element. This argument also may contain a `\label`. The second argument is the graphic to print. It could, e.g., be a call to `\includegraphic` from the `graphicx` package [8].

Spacing between sub-figures is handled dynamically via `\hfill`. We make sure to tell the `subcaption` that the sub-figures are sub-figures by setting `@captype` appropriately.

```
\long\gdef\figureSeriesElement#1#2{%
\strut\hfill\strut%
\edef\@captype{figure}%
\subcaptionbox{#1}{#2}%
\strut\hfill\strut%%
}%
```

`\figureSeriesRow`

`\figureSeriesRow{`⟨*contents*⟩`}` inserts a new row of elements (sub-figures) into the figure series. Its single argument should thus contain a sequence of `\figureSeriesElements`. Since sub-figures are placed row-by-row, no sub-figure can span multiple rows.

If the overall caption of the figure series has not yet been printed, it would be stored in `\@figSer@delayedCaption`. Thus, if `\@figSer@delayedCaption` is not empty, this macro first prints the delayed caption and then the contents of the row together in a `\parbox` command which is wrapped into a `center` environment. The reason why we need to delay caption printing is that LaTeX's page breaking algorithm may separate the caption from the first figure row if the figure series starts close to the bottom of the page. Thus, we pack the delayed caption together with the first row of figures into a `\parbox` command. `\parbox`es are not affected by page breaking and always remain as solid objects. If the caption has already been printed, i.e., `\@figSer@delayedCaption` is empty, we do not need the awkward `\parbox`.

Plain `\parbox`es, however, seem to not work we with the breaking of the `figureSeries` into multiple pieces to facilitate page breaking later on. Thus, we need to wrap everything into a `center` environment. Since I am not sure why this is (see Section 3.3.5), this may be one of dodgy parts of this package.

```
\long\gdef\figureSeriesRow#1{%
\begin{center}%
\ifx\@figSer@delayedCaption\@empty%
\vspace\abovecaptionskip%
\strut#1\strut%
\else%
\parbox[b]{\textwidth}{%
\@figSer@delayedCaption%
\xdef\@figSer@delayedCaption{}%
\vspace\abovecaptionskip%
\strut#1\strut%
}%
\fi%
\end{center}%
}%
```

The following two macros, `\figureSeriesHere` and `\figureSeriesFloat`, basically act as switches according to the different situations given in Section 3.3.2. Basically, different things need to be done for

1. the non-floating (“Here”) or floating (“Float”) case, as well as for

2. single-column or double-column documents.

`\figureSeriesHere`

The macro `\figureSeriesHere{`⟨*caption*⟩`}{`⟨*contents*⟩`}` tries to insert a non-floating figure series at the current position in the document. This means that it may begin wherever, well, it is defined, e.g., in the middle of the page.

The macro has two mandatory parameters, the caption and the contents. The caption will (different from usual `figure`s) be put at the beginning of the figure series. The reason is that a figure series may span over multiple pages and having the caption at the end may be awkward. The caption text may contain a `\label`.

The contents of a figure series should be a sequence of `\figureSeriesRow` calls.

Since figure series are page-wide elements, starting them in the middle of the page only works in single-column documents. In two-column documents, any figure series will behave as specified in macro `\figureSeriesFloat` below.

```
\long\def\figureSeriesHere#1#2{%
\@figSer@detectColumns%
\if@figSer@isTwoColumns%
\@figSer@hereTwoCol{#1}{#2}%
\else%
\@figSer@hereOneCol{#1}{#2}%
\fi%
}%
```

\figureSeriesFloat

The macro \figureSeriesFloat{⟨*caption*⟩}{⟨*contents*⟩} takes the same parameters as \figureSeriesHere, but has a float-like behavior. By using the \afterpage command from the afterpage package [7], we let it start at the following page. This is different from LaTeX' normal floating behavior, but as good as we can get with page-breaking objects, I think.

```
\long\gdef\figureSeriesFloat#1#2{%
\@figSer@detectColumns%
\if@figSer@isTwoColumns%
\@figSer@floatTwoCol{#1}{#2}%
\else%
\@figSer@floatOneCol{#1}{#2}%
\fi%
}%
```

3.3 Internal Utility Definitions and Macros

The way in which we can create figure series in double-column mode is different (and very significantly more complex and dodgy) from how it works in single-column mode. We thus need to detect in which mode we are. This is done in the following code. Since my knowledge of LaTeX and TeX is very limited, this may be quite a crude approach. Also, this code will probably not work if you load the multicol package. It will definitely not work with more than two columns.

3.3.1 Two-Column Mode Detection

Anyway, I first define a new Boolean flag \if@figSer@isTwoColumns, which will denote whether or not we are in two-column mode. It is initialized to false.

```
\newif\if@figSer@isTwoColumns%
\@figSer@isTwoColumnsfalse%%
```

\@figSer@detectColumns

The internal macro \@figSer@detectColumns detects whether or not we are in two-column mode. It will set \if@figSer@isTwoColumns to \@figSer@isTwoColumnstrue if yes and to \@figSer@isTwoColumnsfalse otherwise.

```
\def\@figSer@detectColumns{%
\@figSer@isTwoColumnsfalse%
\ifx\multicols\@undefined%
\else%
\ifnum\col@number>\@ne%
\@figSer@isTwoColumnstrue%
\fi%
\fi%
\if@twocolumn%
\@figSer@isTwoColumnstrue%
\fi%
}%
```

3.3.2 The Four Cases

Our figure series are basically nothing else than simple array of rows. Each \figureSeriesRow is a \parbox wrapped into a center environment and the \figureSeriesElements are horizontally distributed inside using \struts and \hfills.

There are four situations that need to be distinguished when building a figureSeries and for each of which we define an appropriate internal macro:

1. Single-column mode and \figureSeriesHere. This is the easiest situation, we just apply the approach discussed above as-is. It will perfectly line into the existing text.

2. Single-column mode and \figureSeriesFloat. In this case, we just put our macro into an \afterpage call.

3. Double-column mode and \figureSeriesFloat: This is the tricky part. We need to leave double-column mode to single-column mode, insert our environment, and revert back to double-column mode. This causes all sorts of problems and oddities, as discussed later.

4. Double-column mode and \figureSeriesHere: Same as Double-column mode and \figureSeriesFloat.

Anyway, before getting down to business, we first declare \@figSer@delayedCaption as the initially empty container for captions, as discussed when introducing the \figureSeriesRow macro in Section 3.2.

```
\edef\@figSer@delayedCaption{}%
```

3.3.3 Single-Column Mode

Here we discuss the first two cases from Section 3.3.2.

\@figSer@hereOneCol

The internal macro performing the work of \figureSeriesHere in single-column mode. It takes the same arguments as \figureSeriesHere.

```
\long\def\@figSer@hereOneCol#1#2{%
```

We first store the caption in \@figSer@delayedCaption to later be picked up and printed by \figureSeriesRow (as discussed in Section 3.2) in order to prevent LaTeX from putting it alone on the foot of a page. We put the caption into a separate \parbox, because otherwise the first row of sub-figures will have captions on top instead of below (for some reason not clear to me).

```
\def\@figSer@delayedCaption{%
\noindent\parbox{\textwidth}{%
\captionof{figure}{#1}%
```

This command makes the figure caption counter's value global, preserving it for outside the \parbox. Otherwise, the figure counter would always remain 0 (if only figureSeries are used).

```
\global\advance\c@figure by 0%
}%
\par}%
```

Put the contents of the figure series.

```
\begin{center}%
#2%
\end{center}%
```

After the figure series body, we add some small spacing to prevent the text from starting too close to it.

```
\medskip%
}%
```

`\@figSer@floatOneCol`

The internal macro performing the work of `\figureSeriesFloat` in single-column mode. It takes the same arguments as `\figureSeriesFloat`. It basically places the output created by `\@figSer@hereOneCol` into an `\afterpage` call, giving it the same look-and-feel as `\@figSer@hereOneCol` while also looking like a floating object.

```
\long\def\@figSer@floatOneCol#1#2{%
\afterpage{\@figSer@hereOneCol{#1}{#2}}%
}%
```

3.3.4 Double-Column Mode

Here we discuss the last two cases from Section 3.3.2.

Documents with two columns create a big headache. After a long search, I think I have more or less got a working solution. The problem is as follows:

A. Figure series make only sense as page-wide constructs. Figure series can include a sequence of many figures which may span over multiple pages. If we would restrict them to single-column elements, then they could start in the middle of left column and end in the middle of the right column. That would look very odd. Also, it is our goal to create something which looks more or less the same, regardless whether the document is typeset as single- or double-column.

B. This means we need to switch to single-column mode if we are in double-column mode. We can do that with the `\onecolumn` command, but this will always begin a new page. This could mean that we get a (true) page break after only half of the left column. This would look odd. But OK, we can define figure series in double-column mode as floating objects by default and use the same `\afterpage` facility that we used to make figure series in single-column mode float. We then just put the `\onecolumn` into the stuff we float away with `\afterpage` and avoid the ugly page break in the middle of the text.

C. In double-column mode, `\afterpage` behaves more like "`\aftercolumn`". That is, if we are currently in the left column, its contents will not be rendered at the start of the next page, but at the start of the right column. Only if we are in the right column, it will put our stuff on the next page. Well, this is already the answer: If we are in the left column, we do something like `\afterpage{\afterpage{...}}`.

D. The biggest problem is that we need to switch back to double-column mode after our figure series. We can do that with the `\twocolumn` command, but this will entail a `\clearpage` afterwards. This means that even if our figure series only occupies the top 20% of a page, there will be a page break, leaving the rest of the page blank before continuing in double-column mode.

E. After searching for a long time for a solution, I found a lead in an answer to the StackOverflow question `http://tex.stackexchange.com/questions/74433` on a vaguely reated issue. In his answer [14], Tomáš Hejda introduced a way to switch to the `\twocolumn` mode and prepending a long series of vertical boxes. I simply copied his code from the answer into this package but renamed all involved entities to fit to our internal naming scheme.

F. Still, there is another problem: If more than one figure series is started on the same page, then we may get an empty page inbetween because of the `\clearpage` done by `\onecolumn`. The trick here is to detect whether another figure series is "scheduled" but not yet laid out. In this case, we attach the contents of our new figure series to the contents of the pending one (stored in a body macro) via `\g@addto@macro`. After the figure series is actually laid out, the body macro must be emptied.

Alltogether, this is a bit of a Frankenstein's monster. Anyway, here we go with the code.

Let us first allocate a macro placeholder `\@figSer@floatingBody` for the floating figure series body (see Section 3.3.4.G), which will later be filled in by `\@figSer@hereTwoCol`.

```
\xdef\@figSer@floatingBody{}%
```

`\@figSer@afterPage` This macro is invoked in the context of `\afterpage`. It will switch from single-column to double-column mode but print the body of the figure series first (in single-column mode). It thus solves the problem from Section 3.3.4.D by using the solution from [14] mentioned in Section 3.3.4.E.

```
\gdef\@figSer@afterPage{%
\@figSer@longTwoColumnMain[\@figSer@floatingBody]%
\xdef\@figSer@floatingBody{}%
}%
```

`\@figSer@floatTwoCol` The internal macro performing the work of `\figureSeriesFloat` in two-column mode.

```
\long\def\@figSer@floatTwoCol#1#2{%
```

If no figure series is pending, we build the figure series “body” exactly as in the single-column case, but instead of laying it out directly, it is stored in the \@figSer@floatingBody macro.

```
\ifx\@figSer@floatingBody\@empty%
\gdef\@figSer@floatingBody{\@figSer@hereOneCol{#1}{#2}}%
```

Ok, we have now created the body of our figure series, but it is not yet “floating”. We let it float by putting it into an \afterpage if we already are in the second (right) column (\if@firstcolumn is false) or into two nested \afterpages, if we are in the first (left) column (\if@firstcolumn is true).

```
\if@firstcolumn%
\afterpage{\afterpage{\@figSer@afterPage}}%
\else%
\afterpage{\@figSer@afterPage}%
\fi%
```

End of “new” figure series.

```
\else%
```

OK, if we get here, a figure series is pending. In this case, the body of the current figure is appended to it as discussed in Section 3.3.4.G. We do not need to \afterpage a call to \@figSer@afterPage since there must already be one enqueued.

```
\g@addto@macro{\@figSer@floatingBody}{\@figSer@hereOneCol{#1}{#2}}%
\fi%
}%
```

\@figSer@hereTwoCol The macro \@figSer@hereTwoCol represents the fourth case listed in Section 3.3.2. Since there is no way we can have a page-wide object in the middle of a double-column page that I know of, for now, this case simply behaves like the double-column floating case.

```
\let\@figSer@hereTwoCol\@figSer@floatTwoCol%
```

3.3.5 Switch back to twocolumn According to [14]

Here I include the code provided by Tomáš Hejda in his answer to question http://tex.stackexchange.com/questions/74433 [14]. Instead of copy-pasting it, I changed all naming to match this package’s convention and made one minor modification. The name changing has two reasons: First, it ensures that all parts of this package follow the same naming convention and can easily be identified as parts of this package. Second, if Tomáš Hejda should turn his code into a package (as his answer [14] indicated), there will be no name clashs between his package and mine.

I must point out that I do not really understand this code. I understand roughly what it does, but there are several nuances which are unclear to me.

Also, some of the numbers, like for the page height fraction (0.84) or the vspace (15pt plus 15pt), seem to be fixed to somewhat arbitrary values, which may be better taken from the current configuration (like \floatpagefraction or

`\medskip` something). Right now, I don't have the nerve to check for this, but I may check this again in the future.

Furthermore, I don't understand much about LaTeX box registers, which is maybe why I find it a bit dangerous to use boxes at low indexes (`0`, `1`, `2`). Maybe some box registers should explicitly be allocated in one way or another? I am not sre. This probably really is correct, but as I have too limited knowledge,

Anyway, let's begin with the code. First, a new `newsavebox` is allocated.

```
\newsavebox\@figSer@box%
```

This macro is represents the body of the figure series. In a loop, chunks as big as possible but small enough to fit on a page are cut off and printed. Different from [14], we implement this macro for re-use in the next figure series. The equivalent `\longtwo@repeat` macro in [14] seems to ultimately overwritten and, from what I can see at first glance without testing, can only be used once.

`\@figSer@breakBodyRepeat@Orig`

```
\def\@figSer@breakBodyRepeat@Orig{%
\@figSer@longTwoColumn[{\@twocolumnfalse%
\ifdim\ht\@figSer@box>1.00\textheight%
\begingroup%
\vbadness10000%
\setbox0\vsplit\@figSer@box to 1.00\textheight%
\setbox1\vbox{\unvbox\@figSer@box}%
\global\setbox\@figSer@box\vbox{\unvbox1}%
\setbox2\vbox to \textheight{%
\unvbox0%
}%
\ht2=0.9\textheight%
\box2%
\endgroup%
\else%
\ifdim\ht\@figSer@box>0.84\textheight%
\global\let\@figSer@breakBodyRepeat\clearpage%
\else%
\global\let\@figSer@breakBodyRepeat\relax%
\fi%
\unvbox\@figSer@box%
\vspace{15pt plus 15pt}%
\fi%
}]%
\@figSer@breakBodyRepeat%
}%
```

`\@figSer@longTwoColumnMain` This is the main entry point to our version of Tomáš Hejda's method [14], equivalent to his `\longtwo@` macro, with the slight difference that we restore `\@figSer@breakBodyRepeat` and thus can use this macro multiple times.

```
\long\def\@figSer@longTwoColumnMain[#1]{%
\let\@figSer@breakBodyRepeat\@figSer@breakBodyRepeat@Orig%
\begingroup%
\let\@figSer@longTwoColumn\twocolumn%
\@figSer@longTwoColumn[{\@twocolumnfalse%
\global\setbox\@figSer@box\vbox{#1}%
\ifdim\ht\@figSer@box>\textheight%
\begingroup%
\vbadness10000%
\setbox0\vsplit\@figSer@box to 1.00\textheight%
\setbox1\vbox{\unvbox\@figSer@box}%
\global\setbox\@figSer@box\vbox{\unvbox1}%
\setbox2\vbox to \textheight{%
\unvbox0%
}%
\ht2=0.9\textheight%
\box2%
\endgroup%
\else%
\ifdim\ht\@figSer@box>0.87\textheight%
\global\let\@figSer@breakBodyRepeat\clearpage%
\else%
\global\let\@figSer@breakBodyRepeat\relax%
\fi%
\unvbox\@figSer@box%
\fi%
}]%
\@figSer@breakBodyRepeat%
\endgroup%
}%
```

3.4 Tests and Incompatibilities

`figureSeries` loads the packages `caption` [5], `subcaption` [6], and `afterpage` [7]. Therefore it inherits all incompatibilities of these packages. The `subcaption` package, for instance, is not compatible with the packages `subfigure` and `subfig`.

3.5 Related Work

The `longfigure` package [13] provides a similar functionality, i.e., a figure environment that can wrap over multiple pages. This environment can be made to float by using `\afterpage`, but does not work in double-column documents.

Tomáš Hejda's method [14], which is used by our package, may be extended to provide similar functionality, if it is published as package as indicated in [14].

3.6 License

The copyright (c) of this work is with Thomas Weise (`http://www.it-weise.de`) except for the code in Section 3.3.5. The code in Section 3.3.5 is a modified version from Tomáš Hejda's (tohecz@gmail.com) answer [14] to question `http:`

//tex.stackexchange.com/questions/74433. The copyright of this is thus not clear to me, so I won't claim it :-)

The distribution of this package may also contain the LaTeX document classes llncs.cls [10], IEEEtran.cls [11], and sig-alternate.cls [12]. The copyrights of these files are with their respective owners and these owners alone can determine the license terms for these files. The files are just included here to make the examples stand-alone. They may not be up-to-date, so please download their latest versions from their respective locations.

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Change History

v0.9.0

General: Initial Draft Version 1

v0.9.1

General: Better examples showing the shortcomings of the package (in particular in two-column mode). 1

v0.9.2

General: Shortcomings in two-column mode fixed: vertical column starts are now aligned well. 1

Index

Numbers written in italic refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; numbers in roman refer to the code lines where the entry is used.