

# Fourier Optics

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All OL manuscripts should be submitted in two-column format to assist length estimate. OSA no longer requires submission of single-column double-spaced text. This template, along with associated style files, should be used to prepare an article for submission to *Optics Letters* (OL). Examples are given of how to account for some of the factors that affect the accuracy of the length estimate: figures, tables, equations, and author affiliations. Note that this template is only a guideline, and not a guarantee, of final page length.

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Authors should prepare all OL manuscripts with the `[twocolumn]` option. This will assist both the author and OSA staff in estimating final page count. Preparing a length-check manuscript also involves setting tables and figures within the body of the paper with appropriate sizing commands and placing the `\twocolumn[...]` command around the titlepage elements (as explained below). There are also instructions at the end of the template for setting up author affiliations properly. Note that it is no longer necessary (or desirable) to set articles in single column or to set figures and tables at the back of the manuscript.

Sample code for the preamble is as follows:

```
\documentclass[10pt,twocolumn]{article}
\usepackage{ol}
%% Figures should be placed in body
%% of manuscript and
%% sized appropriately.
```

The command `\twocolumn[...]` must be placed around the titlepage elements in the two-column option. Note that proper figure, table, and caption environments should be used (see samples below).

**Displayed equations** may be the most problematic for two-column display. *Optics Letters* equations are usually set in one column; breaks and alignment should bring out the structure of the math:

$$\begin{aligned} \dot{E}_{x,y} = & \frac{1}{2} (1 + j\alpha) (G_{x,y} - \gamma) E_{x,y} \\ & + \kappa E_{x,y} (t - \tau) \exp(-j\Omega_{x,y}\tau) \\ & + (\beta_{sp}N)^{1/2} \xi_{x,y}. \end{aligned} \quad (1)$$

Use standard LaTeX or AMSTeX environments. For equations that *must* span two columns, it is possible to use a float environment, e.g., `\begin{figure*}... \end{figure*}`. Such an environment will not interfere with figure or table numbering (which is controlled by the caption), but it *will* cause equations to float, often with unwanted consequences.

**Figures** should be set to one-column size ( $\sim 8.3$  cm) whenever possible; **tables** should also be set to one column whenever possible, but tables with more than five

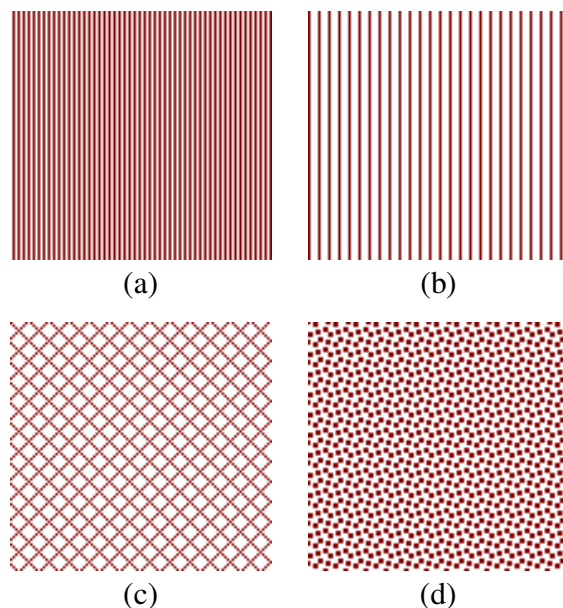


Fig. 1. One-column figure set with the figure environment.

columns will probably need to be set to two columns. For two-column layout, figures and tables can be set across both columns with the alternate figure and table environment commands `\begin{figure*}... \end{figure*}` instead of `\begin{figure}... \end{figure}`. Note that tables are typeset and cannot be reduced in size like art, which may require more space than in the submitted paper.

*Sample figure environment:*

```
\begin{figure}[htb]
\centerline{
\includegraphics[width=8.3cm]{richardson-f1.eps}}
\caption{Sample figure.}
\end{figure}
```

**References** callouts are now formatted with the `cite` package, which produces bracketed reference style (e.g., [1]). For online callouts, e.g., see [1], the words “Ref.” and “Refs.” are not required.

Before submitting, authors who use BibTeX should first run BibTeX, then paste the contents of the output



Table 2. Sample Table

TEST	TEST	TEST	TEST	TEST	TEST	TEST	TEST	TEST
TEST	TEST	TEST	TEST	TEST	TEST	TEST	TEST	TEST
TEST	TEST	TEST	TEST	TEST	TEST	TEST	TEST	TEST
TEST	TEST	TEST	TEST	TEST	TEST	TEST	TEST	TEST

The behaviour of the system is wholly different between conditions of coherent and incoherent imaging, and the first two parts of this reports will present those behaviours. The last part will describe the effects due to the use of a digital camera and a discussion of the behaviour of the system under conditions of mixed coherence.

[add results]

### experimental set-up

The optical system under study consisted in two identical lenses, sharing a common focal point where was placed is .... It is represented in the figure ??

In the case were the aperture iris is completely open, and when the system is perfectly focused, the image is exactly the intensity distribution at the first focal plane of the second lens.

This 4-f system provides considerable insight in the theory of Fourier optics, as it links to significant results : one being that a lens realises the Fourier transform of its front focal plane in its back focal plane, and the other being that a general imaging system realises the multiplication of the Fourier spectrum of the object by its transfer function. Here it is highlighted as the transfer function comes mostly from the aperture stop, placed precisely at the common focal plane of the two lenses, realizing directly the frequency filtering process.

#### 1. Coherent illumination

two amplitudes at one point are summing up  $\Rightarrow$  intensity is not the sum of intensity : interference cross-term appears  $\Rightarrow$  system linear in term of amplitudes

#### 2. Incoherent illumination

no interference  $\Rightarrow$  cross-term vanishes  $\Rightarrow$  two \*intensities\* at one point are summing up  $\Rightarrow$  system linear in intensities

#### 3. Mixed coherence

#### 4. Digital camera

### References

1. Y. and G. Gbur, "Scintillation of Airy beam arrays in atmospheric turbulence," *Opt. Lett.* **35**, 3456 (2010).

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In this section, please provide full versions of citations to assist reviewers and editors (OL publishes a short form of citations) or any other information that would aid the peer-review process.

## References

1. Y. and G. Gbur, "Scintillation of Airy beam arrays in atmospheric turbulence," *Opt. Lett.* **35**, 3456–3458 (2010).

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