Global Illumination for Fun and Profit

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**Abstract**— Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis.Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla,malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum. A free copy of this paper and all supplemental materials are available at [https://OSF.IO/2NBSG](https://osf.io/2NBSG).

**Index Terms**— Radiosity, global illumination, constant time

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*Manuscript received xx xxx. 201x; accepted xx xxx. 201x. Date of*

*Publication xx xxx. 201x; date of current version xx xxx. 201x.*

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Here are examples for use within a sentence: [Fig. 2](#Fig3), [Tab. 1](#Tab1), [Secs. 6](#_Supplemental_Material_Instructions) and [7](#_References), [Eq. (1)](#Eq1). The following sentences all start with a reference: [Figure 2](#Fig3) is a figure environment. [Table 1](#Tab1) is a table environment. [Sections 6](#_Supplemental_Material_Instructions) and [7](#_References) are section environments. [Equation (1)](#Eq1) is an equation environment.

## Subsection Two

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## Subfigures

See [Fig.1](#Fig2) for an example.

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| (a) The letter A. | (b) The letter B. |
| Shape, arrow  Description automatically generated | |
| (c) The letter C. | |

Fig. 1. Example of adding subfigures.

# Equations and Tables

Equations can be added like so:

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Shape  Description automatically generated with medium confidence | (1) |

Tables, such as [Tab. 1](#Tab1) can also be included.

|  |  |  |  |
| --- | --- | --- | --- |
| Table 1. Vis Paper Acceptance Rate | | | |
| Year | Submitted | Accepted | Accepted (%) |
| 1994 | 91 | 41 | 45.1 |
| 1995 | 102 | 41 | 40.2 |
| 1996 | 101 | 43 | 42.6 |
| 1997 | 117 | 44 | 37.6 |
| 1998 | 118 | 50 | 42.4 |
| 1999 | 129 | 47 | 36.4 |
| 2000 | 151 | 52 | 34.4 |
| 2001 | 152 | 51 | 33.6 |
| 2002 | 172 | 58 | 33.7 |
| 2003 | 192 | 63 | 32.8 |
| 2004 | 167 | 46 | 27.6 |
| 2005 | 268 | 88 | 32.8 |
| 2006 | 228 | 63 | 27.6 |
| 2007 | 216 | 56 | 25.9 |
| 2008 | 197 | 50 | 25.4 |

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Chart, line chart

Description automatically generatedFig. 2. visualization of the 1990–2016 vis paper acceptance data, recreated based on Fig. 1 from [1].

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Figure Credits

[Figure 2](#Fig3) is a partial recreation of Fig. 1 from [1], which is in the public domain.

Acknowledgments

The authors wish to thank A, B, C. This work was supported in part by a grant from XYZ.

References

1. P. Isenberg, F. Heimerl, S. Koch, T. Isenberg, P. Xu, C. Stolper, M. Sedlmair, J. Chen, T. Möller, and J. Stasko. vispubdata.org: A Metadata Collection about IEEE Visualization (VIS) Publications. IEEE Transactions on Visualization and Computer Graphics, 23, 2017. doi: 10.1109/TVCG.2016.2615308
2. Kitware, Inc. The Visualization Toolkit User’s Guide, January 2003.
3. W. E. Lorensen and H. E. Cline. Marching cubes: A high resolution 3D surface construction algorithm. SIGGRAPH Computer Graphics, 21(4):163–169, Aug. 1987. doi: 10.1145/37402.37422
4. N. Max. Optical models for direct volume rendering. IEEE Transactions on Visualization and Computer Graphics, 1(2):99–108, June 1995. doi: 10.1109/2945.468400

# Appendices

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