A latex template with helpful macros.

Graeme W. Milton

Department of Mathematics, University of Utah, e-mail: milton@math.utah.edu

June 16, 2020

Contents

Abstract

The abstract goes here.

Key words. Latex Macros, Latex Template

AMS subject classifications 2000. 12345, 12346, 12347

1 Introduction

The main purpose of this is to provide a handy shortcut to creating latex math symbols, using the macros provided in the source code. Besides well known books on tex and latex, such as those of Donald Knuth [5] and Leslie Lamport [6] a good source of information is the website `http://www.math.utah.edu/faq/texmf/` of Nelson Beebe. For putting latex equations into powerpoint presentations see the webpage `http://www.sci.utah.edu/~macleod/talks/equations-ppt.html` of Rob MacLeod.

2 Examples of figures

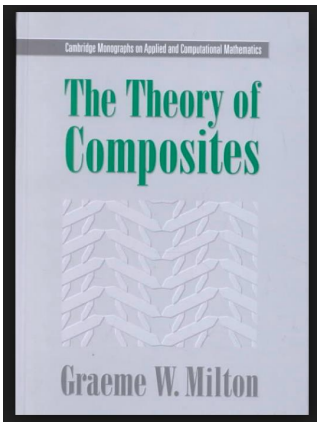
Figure 1 shows the covers of the two books, "The Theory of Composites" [7] and "Extending the Theory of Composites to Other Areas of Science" [8]. Figure 2 shows some covers associated with the reversal of the Hall coefficients. It is an example of the use of subfigures.

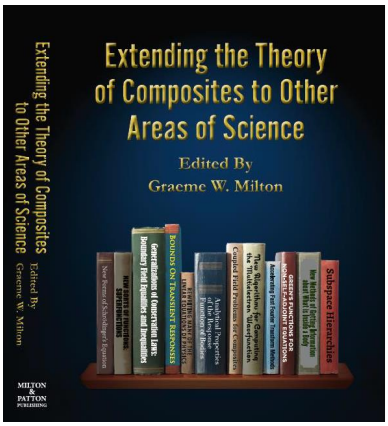
In the coming Section 2.1 we give some examples of equations.

2.1 Examples of some equations

Here is an equation that shows the usefulness of underbraces, the pmatrix environment, and the shorthand for bold roman characters and bold greek characters.

$$\underbrace{\begin{pmatrix}\mathbf{j}_1(\mathbf{x})\\ \mathbf{j}_2(\mathbf{x})\end{pmatrix}}_{\mathbf{J}(\mathbf{x})} = \underbrace{\begin{pmatrix}\boldsymbol{\alpha}(\mathbf{x}) & \boldsymbol{\beta}(\mathbf{x})\\ \boldsymbol{\gamma}(\mathbf{x}) & \boldsymbol{\delta}(\mathbf{x})\end{pmatrix}}_{\mathbf{L}(\mathbf{x})} \underbrace{\begin{pmatrix}\mathbf{e}_1(\mathbf{x})\\ \mathbf{e}_2(\mathbf{x})\end{pmatrix}}_{\mathbf{E}(\mathbf{x})}. \tag{2.1}$$

(a) 

(b) 

4 Chapters with:
Maxence Cassier
Ornella Mattei
Moti Milgrom
Aaron Welters

With tremendous help from Nelson Beebe.

Available on my website

http://www.math.utah.edu/~milton/

Only $80.

Reviewed by Pradeep Sharma (Applied Mech. Reviews) and Yury Grabovsky (SIAM Book Reviews)

Figure 1: An example of a figure. (a) shows my first book [7] published in 2002 that was reviewed by Grégoire Allaire in Math Reviews MR1899805 (2003d:74077). The second book (b) [8] published in 2016, has 4 chapters coauthored with Maxence Cassier, Ornella Mattei, Moti Milgrom, and Aaron Welters, and has been reviewed by Pradeep Sharma in Applied Mechanics Reviews [9] and by Yury Grabovsky in SIAM book reviews [2]. Note the use of protect{} in figure captions when citing articles

The equation (2.1) shows a constitutive law in a composite material where $\mathbf{L}(\mathbf{x})$ denotes the local tensor field. Now we use the equation array environment, to write the differential constraints on the fields

$$\begin{aligned} \nabla \cdot \mathbf{j}_1 = 0, \quad \nabla \cdot \mathbf{j}_2 = 0, \\ \mathbf{e}_1 = -\nabla V_1, \quad \mathbf{e}_2 = -\nabla V_2 \end{aligned} \tag{2.2}$$

In a body Ω the equations (2.1) are satisified in the interior. At the boundary of Ω one may specify the boundary values of the potential:

$$V_1(\mathbf{x}) = V_1^0(\mathbf{x}), \quad V_2(\mathbf{x}) = V_2^0(\mathbf{x}) \text{ for all } \mathbf{x} \in \partial\Omega. \tag{2.3}$$

3 Another Section

Here we give an elasticity equation with no number:

$$\boldsymbol{\sigma}(\mathbf{x}) = \boldsymbol{\mathcal{C}}(\mathbf{x})\boldsymbol{\epsilon}(\mathbf{x}), \quad \text{where} \boldsymbol{\epsilon} = \tfrac{1}{2}[\nabla \mathbf{u} + (\nabla \mathbf{u})^T].$$

and one with a number, reflecting the new Section 3:

$$\nabla \cdot \boldsymbol{\sigma} = 0. \tag{3.1}$$

where $\partial\Omega$ represents the boundary of the region Ω.

Acknowledgements

The author is greatful to Nelson Beebe, a fountain of knowledge about Tex and Latex, for his help and friendly advice and, in particular, for his generous assistance in producing the books shown in figure 1. Additionally the author is grateful to the National Science Foundation for supporting his research.

Bibliography

For references bibtex is recommended as it saves having to reformat references according to the journal style. Instead one uses a .sty file appropriate to the journal to which you are submitting your paper. A lot of bibtex entries associated with the fields of my research are in the files tcbook.bib and newref.bib that can be found on my website.

Here we use just a plain bibliography stlye file. Substitute for plain.sty, whatever style file you require. The bibtex files tcbook.bib and newref.bib contain the bibliography references: tcbook.bib are those referenced in my book "The theory of composites" [7], and newref.bib are those referenced since that book was finished. Both files are available on my website.

References

[1] Marc Briane and Graeme W. Milton. Homogenization of the three-dimensional Hall effect and change of sign of the Hall coefficient. *Archive for Rational Mechanics and Analysis*, 193(3):715–736, September 2009.

[2] Yury Grabovsky. Book review: Extending the theory of composites to other areas of science. *SIAM Review*, 60(2):475–481, 2017.

[3] Muamer Kadic, Robert Schittny, Tiemo Bückmann, Christian Kern, and Martin Wegener. Hall-effect sign inversion in a realizable 3D metamaterial. *Physical Review X*, 5(2):021030, April/June 2015.

[4] Christian Kern, Muamer Kadic, and Martin Wegener. Experimental evidence for sign reversal of the Hall coefficient in three-dimensional metamaterials. *Physical Review Letters*, 118:016601, January 2017.

[5] Donald E. Knuth. *The TeXbook*. Addison-Wesley, Reading, Massachusetts, first edition, 1986.

[6] Leslie Lamport. *LaTeX: A Document Preparation System*. Addison-Wesley, Reading, Massachusetts, second edition, 1985.

[7] Graeme W. Milton. *The Theory of Composites*, volume 6 of *Cambridge Monographs on Applied and Computational Mathematics*. Cambridge University Press, Cambridge, UK, 2002. Series editors: P. G. Ciarlet, A. Iserles, Robert V. Kohn, and M. H. Wright.

[8] Graeme W. Milton (editor). *Extending the Theory of Composites to Other Areas of Science*. Milton–Patton Publishers, P.O. Box 581077, Salt Lake City, UT 85148, USA, 2016.

[9] Pradeep Sharma. Book review: Extending the theory of composites to other areas of science. *Journal of Applied Mechanics*, 84(3):036501–1, 2017.

(a) Physical Review Letters Cover

(b) Physics Today Cover

(c) Nature Reviews Cover

Figure 2: An example of the use of subfigures. These cover figures show a simplified version [3] of the metamaterial that we proved would reverse the sign of the Hall coefficient [1], experimentally confirmed by the group of Martin Wegener [4].