The package EASYVECTOR

Enrico Bertolazzi

Department of Mechanics and Structures Engineering
University of Trento
via Mesiano 77, I – 38050 Trento, Italy

enrico.bertolazzi@ing.unitn.it

19th March 2002

Abstract

The EASYVECTOR package is a simple macro package that provides a C-like syntax for writing vectors or matrices.

Contents

1 Some examples with EASYVECTOR 2
2 Use of the `\newvector` command 2
3 Use of the `!` command 3
4 Use of the `\newcustomvector` command 4
5 The “definevectors” option 4
6 The “@” convention 4

1 Some examples with EASYVECTOR

The package is loaded by means of the usual way:

```
\documentclass{article}
.
.
\usepackage[spacesep,definevectors]{easyvector}
.
.
```

The package option `spacesep` means that the separator for the indices is the command `\smallspace` instead of "`,`" (comma).

The package option `definevectors` means that the command `\aa`,..., `\zz` and `\AA`,..., `\ZZ` are predefined as vectors. It also defines the commands `\Balpha`, `\Bbeta` and so on, as bold greek vectors. The latex commands `\aa`, `\AA`, `\gg`, `\ll`, `\ss`, `\SS`, `\tt` are saved in the commands `\oldxx` where **xx** is the name of the old command.

2 Use of the `\newvector` command

The general syntax of `\newvector` command is

```
\newvector[\cmda,\cmdb]{cmd}
```

or

```
\newvector(a)[cmd]
```

In the first case, it creates the new command (macro) `\cmd` which executes `\cmda` when in scalar mode and `\cmdb` when in vector mode. In the second case it creates a new command `\cmd` which substitutes the letter `\mathit{a}` when in scalar, mode and `\mathbf{a}` when in vector mode. Scalar mode is activated when `\cmd` is immediately followed by `[`. In scalar mode everything between `[` and `]` (with balancing) is assumed to be as an index. For example the commands

```
\newvector[\alpha,\beta]{W}
\newvector[X,\mathbf{X}]{X}
\[ \W = (\W[i,j]), \qquad \X = (\X[i,j;k])\]
```

$$\beta = (\alpha_{i,j}), \qquad \mathbf{X} = (X^{k}_{i,j})$$

The structure of the `[...]` command is the following

```
[i,j,...,k;x,y,...,z]
```

where `i,j,...,k` are subscripts and `x,y,...,z` are superscripts. The comma "`,`" is used as a separator between different indices, and the semi-colon "`;`" separates subscripts and superscripts. There are no limits on the number of indices, and the code is reentrant, as the following example illustrates

```
\newvector(a)[av]
\newvector(b)[bv]
\[ \av = \pmatrix{ \av[1,1] & \av[1,2] \cr
                   \av[2,1] & \av[2,2] \cr}, \qquad
   \bv = \left\{ \bv[\gamma,\bv[i,j;k];a] \right\}
\]
```

$$\mathbf{a} = \begin{pmatrix} a_{1,1} & a_{1,2} \\ a_{2,1} & a_{2,2} \end{pmatrix}, \qquad \mathbf{b} = \left\{ b^{a}_{\gamma,b^{k}_{i,j}} \right\}$$

3 Use of the ! command

It is possible to enforce vector mode also when using indices by using the character `!` before `[`

```
\newvector(z)[zzz]
\[ \zzz[1,2,3] \neq \zzz![1,2,3] \]
```

$$z_{1,2,3} \neq \mathbf{z}_{1,2,3}$$

4 Use of the \newcustomvector command

In some circumstances the command \newcustomvector can be useful. Is is essentially the \newvector command with an extra argument that is a macro to manage the index part.

```
\def\myindex[#1,#2,#3]{_{#1_{#2}}^{#3}}
\newcustomvector[\mathtt{a},\mathbf{a}]{aaa}\myindex
\[ \aaa[1,2,3], \qquad \aaa[3,2,1], \qquad \aaa \]
```

$$\mathtt{a}_{1_2}^{3}, \qquad \mathtt{a}_{3_2}^{1}, \qquad \mathbf{a}$$

Important: For old users (version < 0.6) the command \customindex is suppressed and the \newcustomvector is used instead.

5 The "definevectors" option

This option defines the following vectors for you:

```
\aa,\bb,...,\zz     \AA,\BB,...,\ZZ
\Balpha, \Bbeta, ..., \Bomega
```

for example

```
\[
  \Balpha[i,j], \quad \Balpha,
  \quad \BB[i,j], \quad \BB,
\]
```

$$\alpha_{i,j}, \quad \boldsymbol{\alpha}, \quad B_{i,j}, \quad \mathbf{B},$$

6 The "@" convention

In linear algebra it is common to use the notation $\mathbf{A}_{\bullet,j}$ to denote the vector formed by the j^{th} column of $\mathbf{A}$. Note that $\mathbf{A}$ is in vector format not in scalar format (A).

We can use "•" as an index in a vector forcing the vector mode by using @ as follows:

```
\[ \AA[@,j], \qquad \Balpha[i,j;@] \]
```

$$\mathbf{A}_{\bullet,j}, \qquad \boldsymbol{\alpha}^{\bullet}_{i,j}$$