

# The `undertilde` package

Benjamin BAYART  
French Data Network  
bayartb@edgard.fdn.fr

Printed on June 23, 2005  
Last change on 2000/08/08

## Abstract

This document describes the use and implementation of the package `undertilde` to typeset a tilde under one or several math symbols.

## 1 Usage

This package provides a `\undertilde` command, which behave more or less like the  $\TeX$  `\tilde` accent, except that the resulting accent is put under the letter. One can think about extending the package to other “growing accents” like hat and so on, it is not yet done, maybe in a future release.

The syntax is rather evident:

```
\undertilde{a} \neq \tilde{a}
```

Which produces, in math mode:  $\underline{a} \neq \tilde{a}$ . The under accent behaves correctly in all the circumstances where it was tried. The only limit is the one encoded in the font itself, there is a size limit for such accents.

It can be used in fractions, square-roots, and so on. It can also span several letters. In some cases, the resulting maths can look strange, like that:

```
\frac{\undertilde{ab}}{c} \neq \frac{ab}{c}
```

Which result in  $\frac{\underline{ab}}{c} \neq \frac{ab}{c}$ .

Lets consider this to be a feature and not a bug.

## 2 How to make this work?

In fact, it's rather easy. In the math fonts, at least the one considered here, the fifth dimension is the minimal amount of white space to be put under a math accent (cf.  $\TeX$ book).

Thus, proceed in N steps:

1. Typeset the argument, measure its width.
2. Typeset a normal tilde over a “nothing” of the same width and of no height.
3. Make a stack with the argument, then the tilde, then a negative space to remove the white vertical space added by  $\TeX$ .

### 3 Details of the implementation

The usual proclamations:

```
1 <*package>
2 \ProvidesPackage{undertilde}[2000/08/08 v1.0 Tilde under a math object]
```

First, we allocate a register to store the value of the fifth fontdimen in the context of the mathematical stuff that is to be typeset (the right font, the right style, the right size).

A command to store the current style (display, text, script, etc) that is in use just before the call (`\mathpal@save`).

```
3 \newlength\knuthian@fdfive
4 \def\mathpal@save#1{\let\was@math@style=#1\relax}
```

Then, the real thing. First, we save the style; then we typeset the argument in box 124.

```
5 \def\utilde#1{\mathpalette\mathpal@save
6             {\setbox124=\hbox{${\was@math@style#1}$}%
```

Now, the hard thing. The box 125 will, in a first time contain nothing (it is used to measure the fontdimen 5).

```
7 \setbox125=\hbox{${\fam=3\global\knuthian@fdfive=\fontdimen5\font$}
```

Then after, it contains the tilde typeset over a white rule of the same width than box 124 (the math material that have to be under-tilded).

```
8 \setbox125=\hbox{${\widetilde{\vrule height 0pt depth 0pt width \wd124}$}%
```

Then we display, directly in the math formula a box containing the math material (box 124), the tilde (box 125) and a negative skip to “remove” the offset added by  $\TeX$  (the minimal height of the accent, from baseline).

```
9             \baselineskip=1pt\relax
10            \vtop{\copy124\copy125\vskip -\knuthian@fdfive}}
11 </package>
```