

ANSYS-Mode for GNU Emacs, an introductory Tutorial for version 15.0.1

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July 25, 2014

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Introducing ANSYS-Mode – an APDL environment

This project supports your APDL workflows with the FEA suite **ANSYS**.

It provides an extra mode to the **GNU Emacs editor** for investigating and coding APDL. The mode offers also managing and communication capabilities for various ANSYS processes, like interactive code debugging with the solver or inquiring the license manager status, etc. Some features are quite sophisticated but its documentation is accessible for ANSYS users with little APDL and **Emacs** experience.

GNU Emacs is an up-to-date, powerful and extensible - yet free - editor. High quality software available for every operating system where ANSYS is running.

In the following **C-c** or e. g. **M-c** means typing the <CTRL> or <ALT> key together with the <c> key.



Download ANSYS-Mode together with the Emacs editor

- ▶ Remarkably there are **no** costs and license restrictions also for commercial use

Most convenient is taking the pre-configured ANSYS-Mode in conjunction with the latest Emacs distribution for Win32/64 from [Google Code's download page](#).



The screenshot shows a web browser window displaying the Google Code download page for 'ansys-mode'. The browser's address bar shows the URL: `code.google.com/p/ansys-mode/downloads/detail?name=ansys-mode-14.5.1.beta.3%2Bemacs-24.2-bin-i386.zip&can=2&q=#makechanges`. The page header includes the 'ansys-mode' logo and the text 'GNU Emacs editor support for working with ANSYS FEA'. Below the header, there are navigation links: 'Project Home', 'Downloads', 'Wiki', 'Issues', 'Source', and 'Administer'. A search bar is also present. The main content area features a download entry titled 'Download: Emacs for Windows: Emacs-24.2 with pre-compiled binaries + ANSYS-Mode 14.5.1 beta3 pre-configured'. On the left side of this entry, it lists: 'Uploaded by: dieter.wilhelm@gmail.com', 'Released: Sep 20, 2012', 'Uploaded: Sep 20, 2012', 'Downloads: 24', 'Type-Archive', and 'OpSys-Windows'. On the right side, it shows the file name 'ansys-mode-14.5.1.beta.3+emacs-24.2-bin-i386.zip' with a size of '49.2 MB'. Below the file name, it provides the 'SHA1 Checksum: 4872cae2bc05a8d63a557f4bd6a09c7df0e896c8' and a link 'What's this?'. A QR code is located at the bottom of the download entry.

code.google.com/p/ansys-mode/downloads/detail?name=ansys-mode-14.5.1.beta.3%2Bemacs-24.2-bin-i386.zip&can=2&q=#makechanges

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ansys-mode
GNU Emacs editor support for working with ANSYS FEA

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★ Download: Emacs for Windows: Emacs-24.2 with pre-compiled binaries + ANSYS-Mode 14.5.1 beta3 pre-configured

Uploaded by: dieter.wilhelm@gmail.com
Released: Sep 20, 2012
Uploaded: Sep 20, 2012
Downloads: 24
Type-Archive
OpSys-Windows

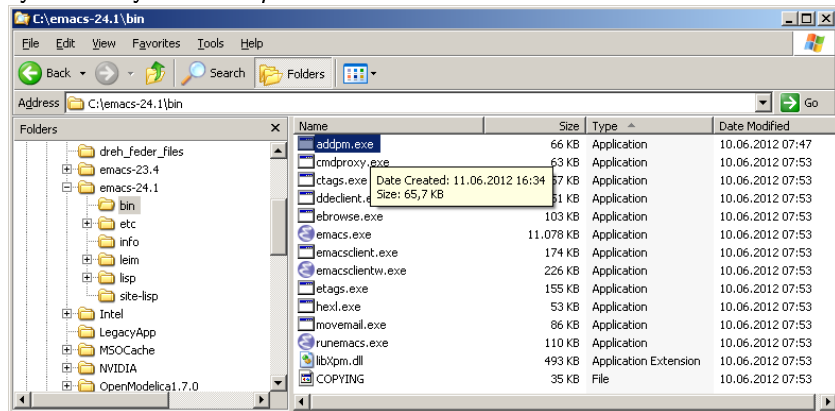
File: [ansys-mode-14.5.1.beta.3+emacs-24.2-bin-i386.zip](#) 49.2 MB

Description:
SHA1 Checksum: 4872cae2bc05a8d63a557f4bd6a09c7df0e896c8 [What's this?](#)



Install ANSYS-Mode together with Emacs

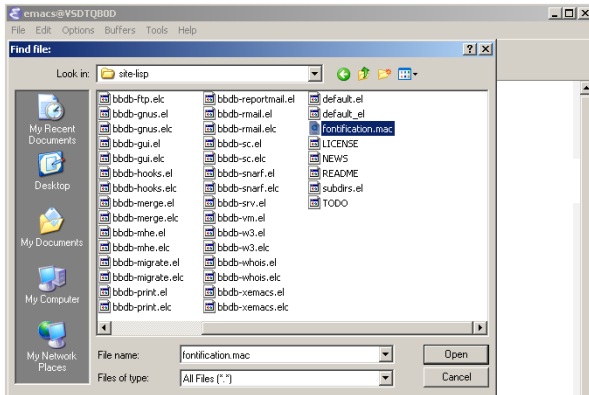
Extract the former zip archive to an arbitrary location on your file system. Optionally you might install Emacs shortcut icons for the system tray with *addpm.exe* in Emacs' *bin* folder.



In this list *runemacs.exe* is the actual editor executable.

Open an APDL macro file with Emacs

Start the editor and open *fontification.mac* in Emacs' *site-lisp* folder or any other APDL file (with the extensions *mac*, *inp*, *dat* or *anf*, otherwise additionally type **M-x ansys-mode** and <RET>).



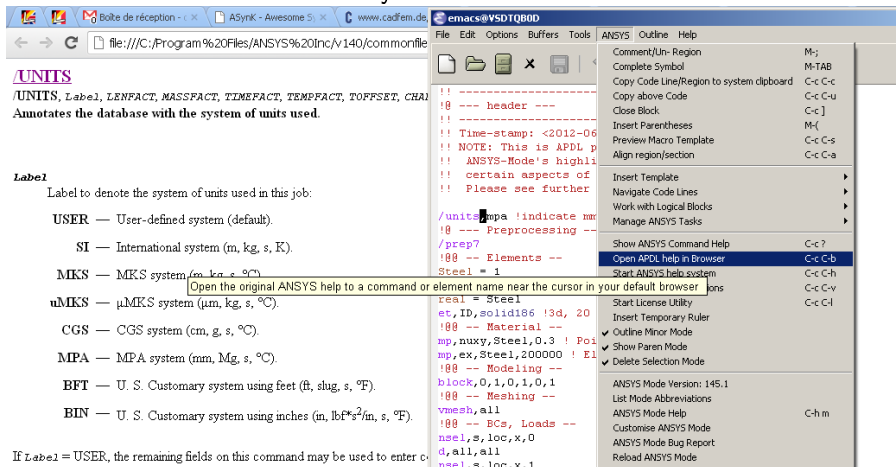
To start... [Open a File](#) [Open Home Directory](#) [Customize Startup](#)
To quit a partially entered command, type **Control-g**.

This is GNU Emacs 24.1.1 (386-mingw-nt5.2.3790)
of 2012-06-10 on MARVIN
Copyright (C) 2012 Free Software Foundation, Inc.

If an Emacs session crashed recently, type **Meta-x recover-session RET**
to recover the files you were editing.

Explore the ANSYS-Mode menu

If ANSYS 14.5 is installed in its default folder *C:\Program Files* under Win64 also system dependent functions are working, like browsing the APDL help with **C-c C-b**, otherwise, you can easily configure this. All described features can be executed through the ANSYS-Mode menu or with keyboard shortcuts.



The screenshot shows the Emacs editor with the ANSYS-Mode menu open. The menu is titled 'ANSYS' and contains several options. The 'Open APDL help in Browser' option is highlighted. The menu also includes options for 'Comment/Un-Region', 'Complete Symbol', 'Copy Code Line/Region to system clipboard', 'Copy above Code', 'Close Block', 'Insert Parentheses', 'Preview Macro Template', 'Align region/section', 'Insert Template', 'Navigate Code Lines', 'Work with Logical Blocks', 'Manage ANSYS Tasks', 'Show ANSYS Command Help', 'Start ANSYS help system', 'Start License Utility', 'Insert Temporary Ruler', 'Outline Minor Mode', 'Show Paren Mode', 'Delete Selection Mode', 'ANSYS Mode Version: 145.1', 'List Mode Abbreviations', 'ANSYS Mode Help', 'Customise ANSYS Mode', 'ANSYS Mode Bug Report', and 'Reload ANSYS Mode'.

UNITS
/UNITS, Label, LENFACT, MASSFACT, TIMEFACT, TEMPPACT, TOFFSET, CHA
Annotates the database with the system of units used.

Label
Label to denote the system of units used in this job:

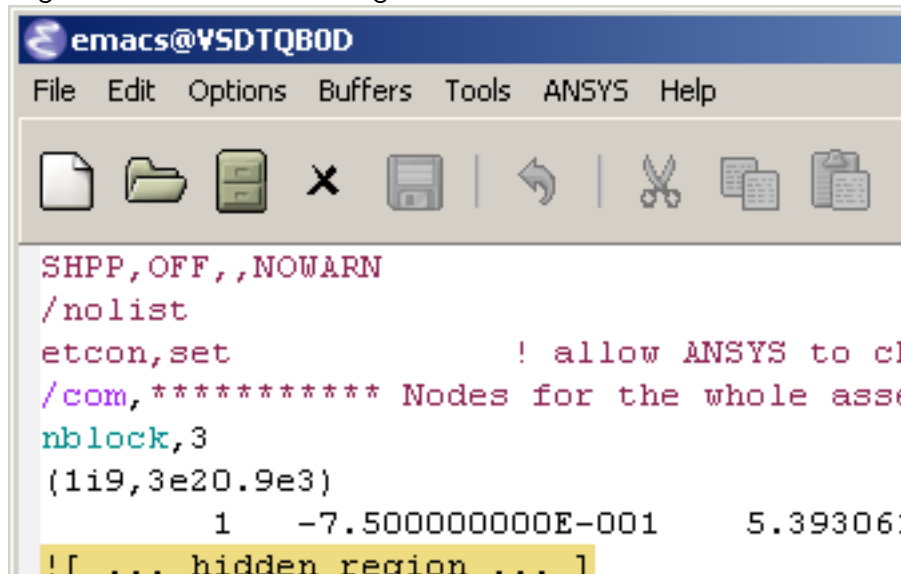
- USER — User-defined system (default).
- SI — International system (m, kg, s, K).
- MKS — MKS system (m, kg, s, °C).
- mMKS — μMKS system (μm, kg, s, °C).
- CGS — CGS system (cm, g, s, °C).
- MPA — MPA system (mm, Mg, s, °C).
- BFT — U. S. Customary system using feet (ft, slug, s, °F).
- BIN — U. S. Customary system using inches (in, lbf*s²/m, s, °F).

If Label = USER, the remaining fields on this command may be used to enter c.

```
!! -----  
!! --- header ---  
!! -----  
!! Time-stamp: <2012-06  
!! NOTE: This is APDL p  
!! ANSYS-Mode's highli  
!! certain aspects of  
!! Please see further  
  
/units,mpa !indicate mm  
!! --- Preprocessing ---  
/prep7  
!!00 --- Elements ---  
Steel = 1  
  
real = Steel  
et, ID, solid186 !3d, 20  
!!00 --- Material ---  
mp, nuxy, Steel, 0.3 ! Poi  
mp, ex, Steel, 200000 ! El  
!!00 --- Modeling ---  
block, 0, 1, 0, 1, 0, 1  
!!00 --- Meshing ---  
vmesh, all  
!!00 --- BCs, Loads ---  
nsel, s, loc, x, 0  
d, all, all  
nsel, s, loc, x, 1
```

Inspect easily WorkBench solver input files (suffix .dat)

ANSYS-Mode hides the normally uninteresting but usually very large number blocks. On the right hand side is the unhidden content.

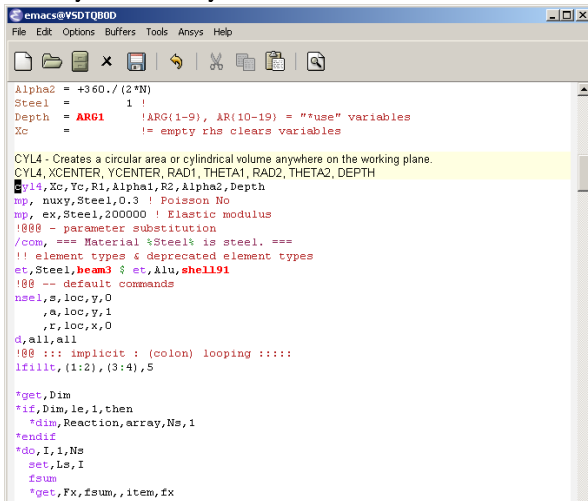


```
emacs@YSDTQBOD
File Edit Options Buffers Tools ANSYS Help

SHPP,OFF,,NOWARN
/nolist
etcon,set                ! allow ANSYS to ch
/com,***** Nodes for the whole asse
nblock,3
(1i9,3e20.9e3)
      1      -7.5000000000E-001      5.39306
! [ ... hidden region ... ]
```

Use the ANSYS-Mode APDL command help

Please type **M-?**, alternatively: **C-c ?**, on a code line and you will see the APDL command's description and syntax (even when the line is commented out). You can continue editing, this temporary overlay - here in yellow - remains visible for a while.



```
emacs@VSDTQB0D
File Edit Options Buffers Tools Ansys Help

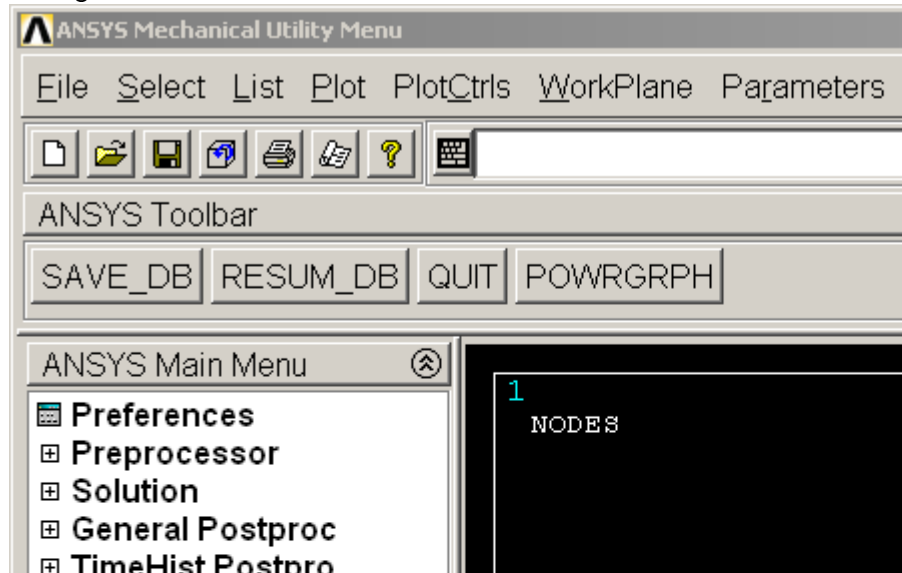
Alpha2 = +360./(2*N)
Steel = 1 !
Depth = ARG1 !ARG(1-9), AR(10-19) = "*use" variables
Xc = ! empty rhs clears variables

CYL4 - Creates a circular area or cylindrical volume anywhere on the working plane.
CYL4,XCENTER,YCENTER,RAD1,THETA1,RAD2,THETA2,DEPTH
*CYL4,Xc,Yc,R1,Alpha1,R2,Alpha2,Depth
mp, nuxy,Steel,0.3 ! Poisson No
mp, ex,Steel,200000 ! Elastic modulus
!000 - parameter substitution
/com, == Material %Steel% is steel. ==
!! element types & deprecated element types
et,Steel,beam3 $ et,Alu,shell91
!00 -- default commands
nsel,s,loc,y,0
,a,loc,y,1
,r,loc,x,0
d,all,all
!00 :: implicit : (colon) looping ::::
lfillt, (1:2), (3:4), 5

*get,Dim
*if,Dim,le,1,then
  *dim,Reaction,array,Ns,1
*endif
*do,I,1,Ns
  set,LS,I
  fsum
  *get,Fx,fsum,,item,fx
```

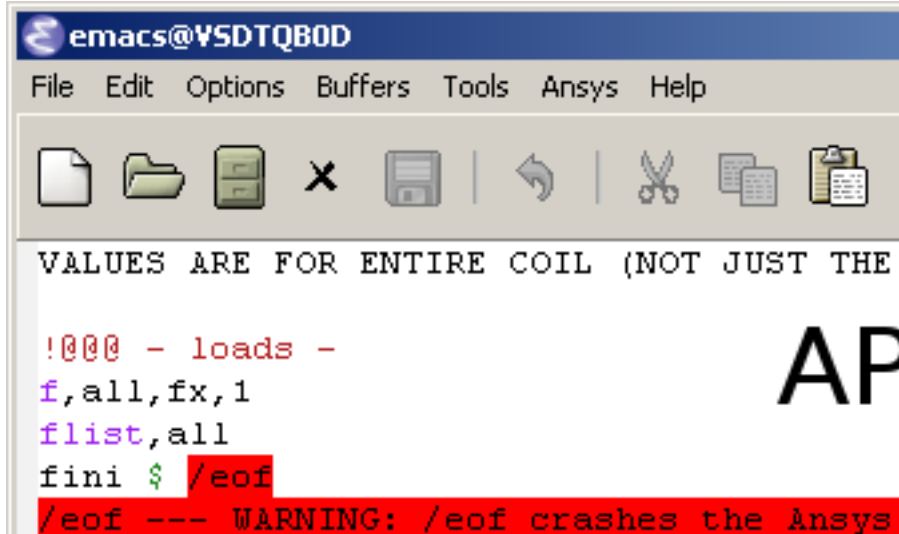

Select and insert templates from the menu into your code

Screenshot with the ANSYS Classics GUI on the left and Emacs on the right on Win64



Preview the extensible APDL code templates

Before inserting an entire template you are able to inspect its content in a preview window (**C-c C-s**) and might just copy the most relevant snippets, please see below and next slide.

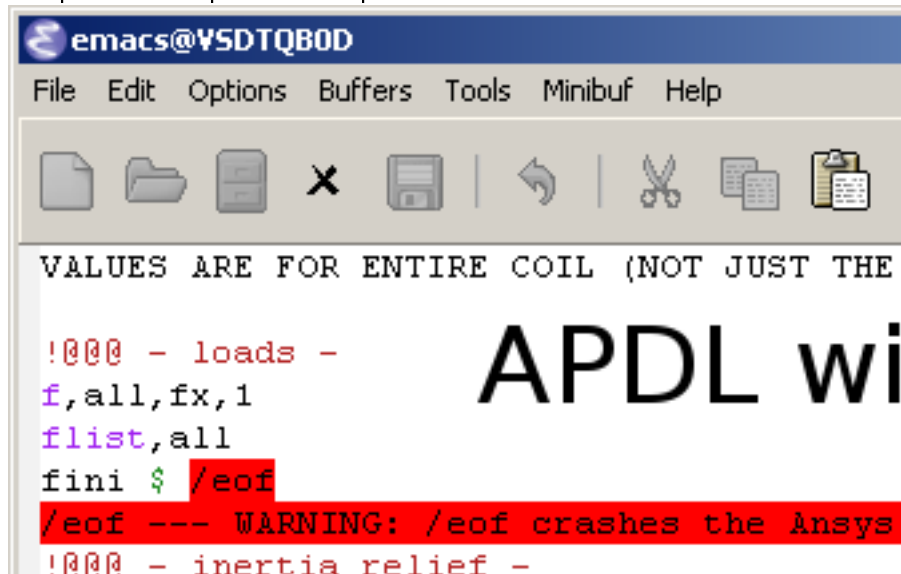


The screenshot shows an Emacs window titled 'emacs@YSDTQBOD'. The menu bar includes 'File', 'Edit', 'Options', 'Buffers', 'Tools', 'Ansys', and 'Help'. The toolbar contains icons for file operations (new, open, save, close, undo, redo, cut, copy, paste). The main text area displays an APDL code template. The first line is 'VALUES ARE FOR ENTIRE COIL (NOT JUST THE'. The second line is '!@@@ - loads -'. The third line is 'f,all,fx,1'. The fourth line is 'flist,all'. The fifth line is 'fini \$ /eof'. The sixth line is '/eof --- WARNING: /eof crashes the Ansys'. The text 'AP' is visible on the right side of the image.

```
VALUES ARE FOR ENTIRE COIL (NOT JUST THE  
!  
f,all,fx,1  
flist,all  
fini $ /eof  
/eof --- WARNING: /eof crashes the Ansys
```

Select an interesting template from a completion window

Type **C-c C-s** to choose a template name, use the **<TAB>** key to complete or to open the completion window of available items.



The screenshot shows the Emacs editor interface. The title bar reads 'emacs@YSDTQBOD'. The menu bar includes 'File', 'Edit', 'Options', 'Buffers', 'Tools', 'Minibuf', and 'Help'. The toolbar contains icons for file operations. The main text area displays an APDL script with the following content:

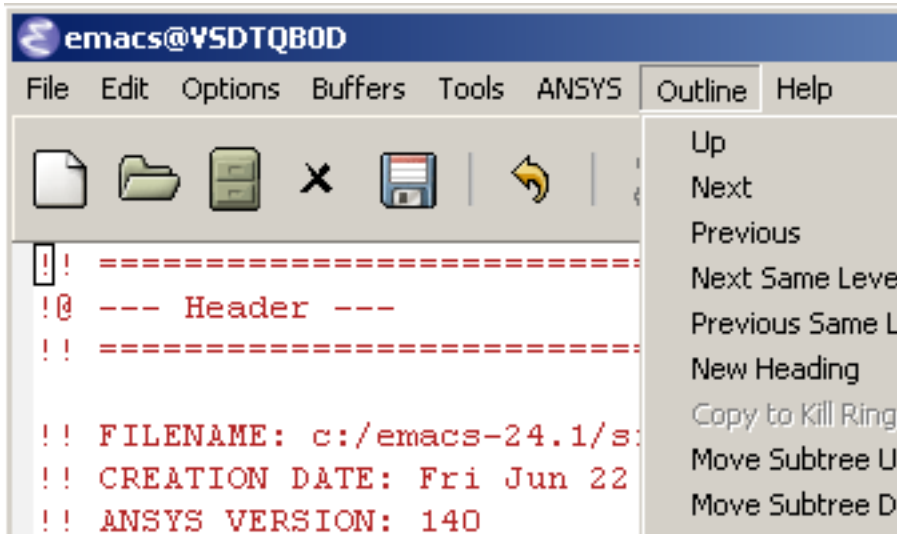
```
VALUES ARE FOR ENTIRE COIL (NOT JUST THE
```

APDL wi

```
!000 - loads -  
f,all,fx,1  
flist,all  
fini $ /eof  
/eof --- WARNING: /eof crashes the Ansys  
!000 - inertia relief -
```

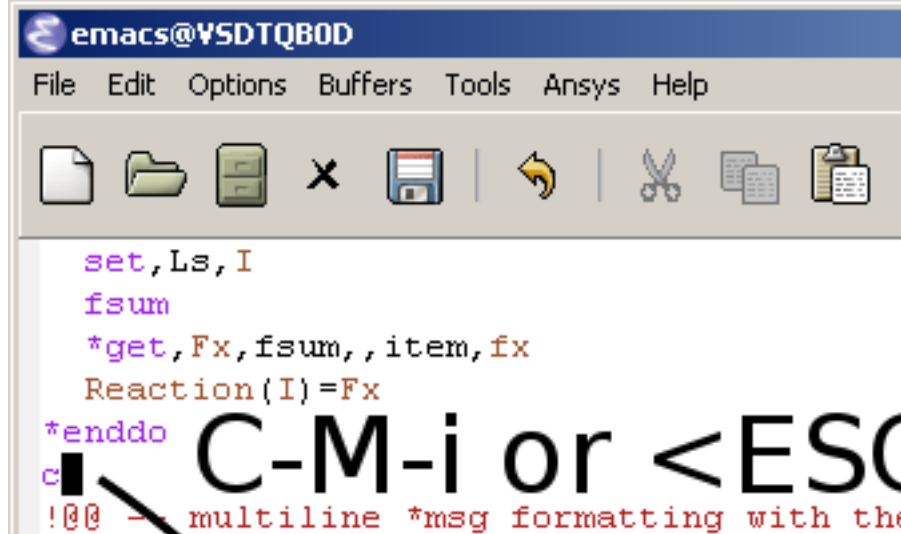
Check auto-insertion and outline your code (tree view)

Create a new APDL file with the suffix `.mac` and let Emacs auto-insert a skeleton with 'outline' headings. Collapse the content to a tree view with **C-c @ C-t** and open all (**C-c @ C-a**) again.



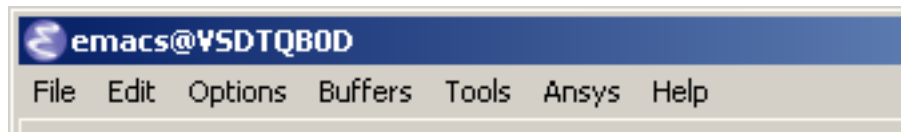
Utilise completions of all – around 2000 – APDL symbols

Move the cursor behind a character - here 'c' - or word fragment and type <ESC> <TAB> or **C-M-i** for completing up to date APDL command-, element- and function names.



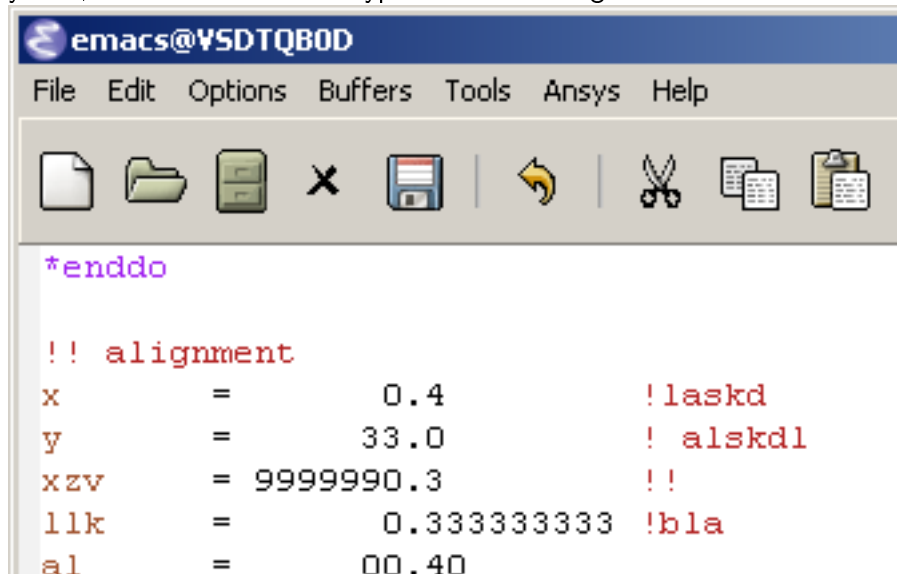
Open a summary window of your APDL variables

Type **C-c C-v** to receive a summary window of all your variable definitions. With an argument (**C-u C-c C-v**) you will get the current value of your variable at the cursor (Linux only, right).



Structure your variable assignments

Move the cursor to a variable definition paragraph or mark, here in yellow, some definitions and type **C-c C-a** to align them.



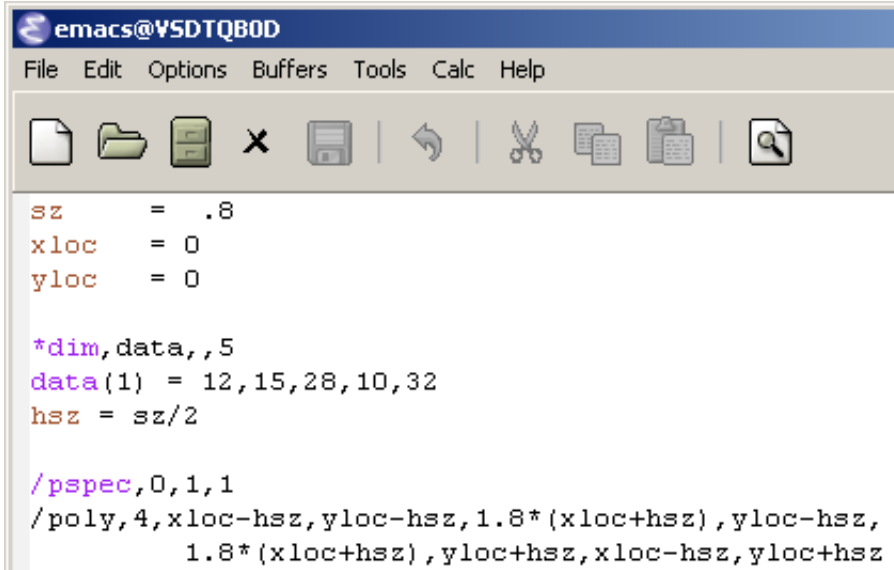
The screenshot shows an Emacs window titled 'emacs@YSDTQBOD'. The menu bar includes 'File', 'Edit', 'Options', 'Buffers', 'Tools', 'Ansys', and 'Help'. The toolbar contains icons for file operations: a new file, a folder, a save icon, a close icon, a floppy disk, a redo icon, a undo icon, a scissors icon, a copy icon, and a paste icon. The text area displays the following code:

```
*enddo

!! alignment
x          =          0.4          !laskd
y          =          33.0         ! alskdl
xzv        = 9999990.3            !!
llk        =          0.333333333 !bla
al         =          00.40
```

Use the Emacs integrated, programmable RPN calculator

Type **C-x * *** to open the calculator, type **y** for pasting results directly into the APDL file. **q** to quit the 'Emacs Calc' windows.



```
emacs@YSDTQB0D
File Edit Options Buffers Tools Calc Help

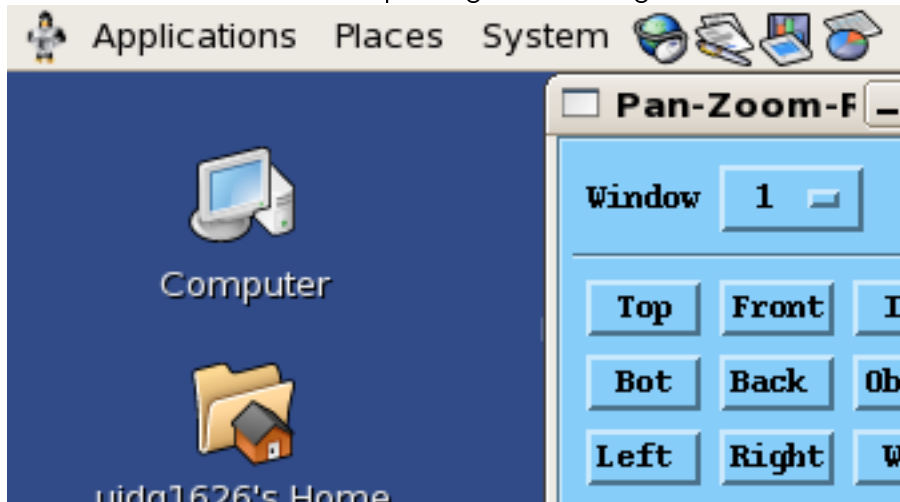
sz      = .8
xloc    = 0
yloc    = 0

*dim,data,,5
data(1) = 12,15,28,10,32
hsz     = sz/2

/pspec,0,1,1
/poly,4,xloc-hsz,yloc-hsz,1.8*(xloc+hsz),yloc-hsz,
      1.8*(xloc+hsz),yloc+hsz,xloc-hsz,yloc+hsz
```

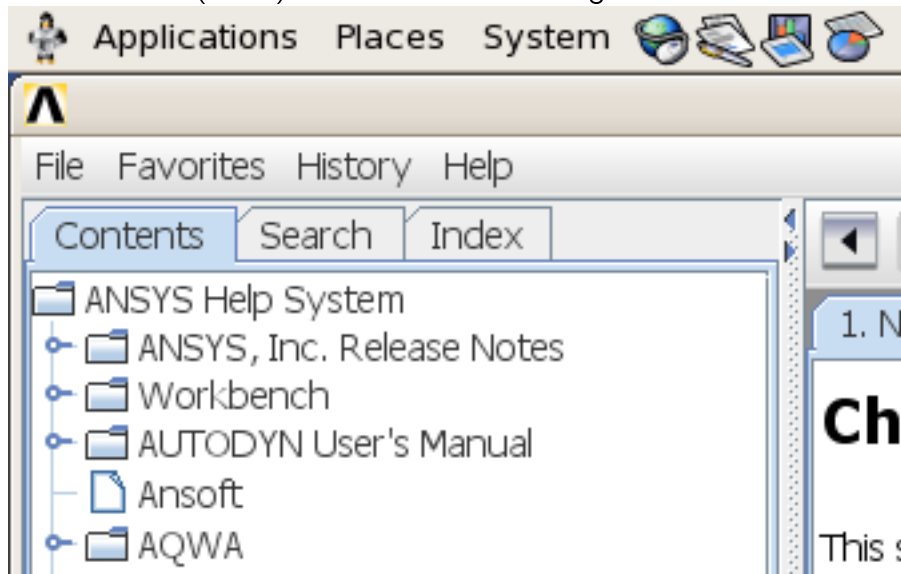

Debug your code interactively with the solver (GNU/Linux)

You can run the ANSYS solver/interpreter under Emacs and send code lines from above APDL window with **C-c C-c** directly to this process. Below you see the **interactive** solver output window and on the left hand side the corresponding ANSYS images.



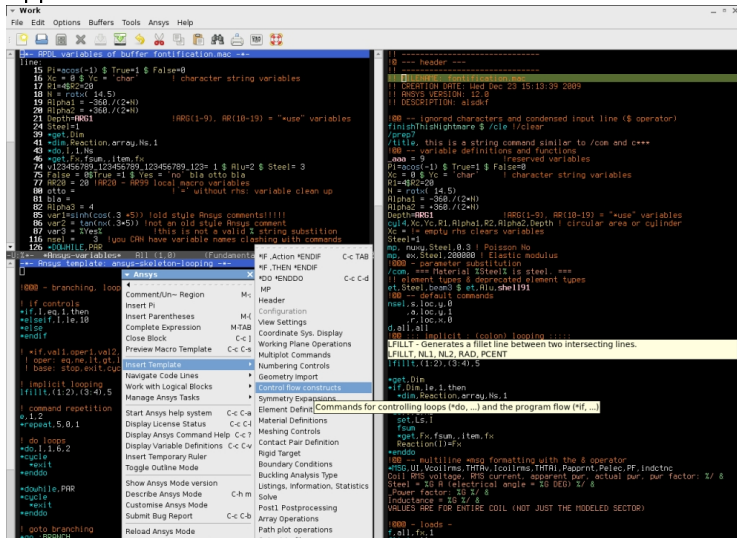
Display the license status and preview images on GNU/Linux

In Emacs' mid-section you see the license state (**C-c C-l**) and left Emacs window (below) a thumbnail view of images from a folder.



Arrange the ANSYS-Mode windows to your needs

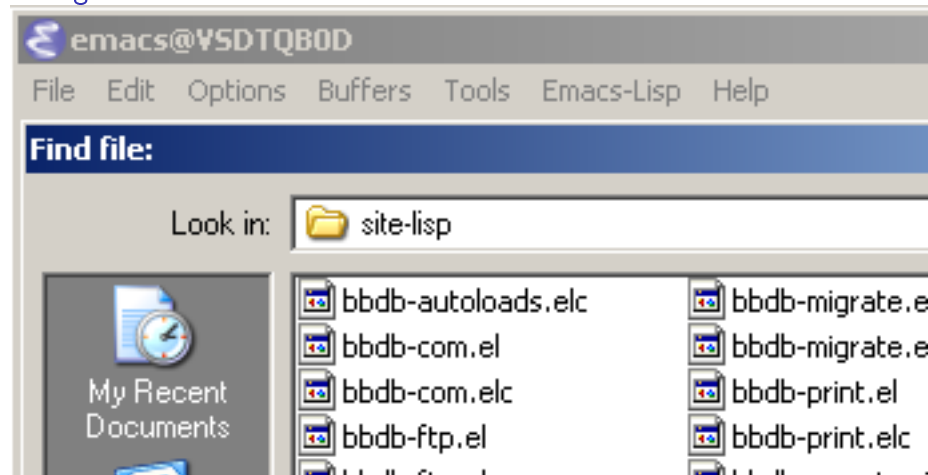
The image shows an Emacs 23.2 frame (in reversed colour mode and compiled with the GTK+ toolkit under GNU/Linux) with a ripped off ANSYS-Mode menu field



Configure system dependent aspects and user options

The mode comes pre-configured for a default installation of ANSYS 14.5 for Win64. If on other systems something is missing adjust

The well commented
configuration file *default.el*

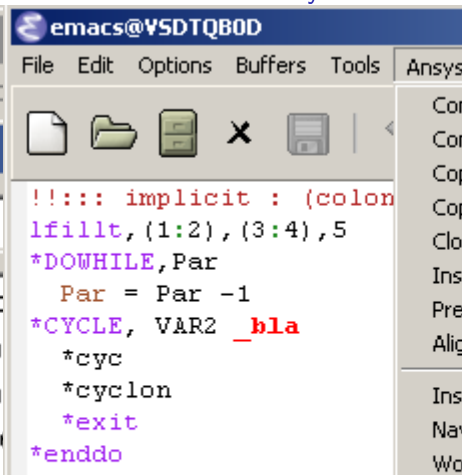
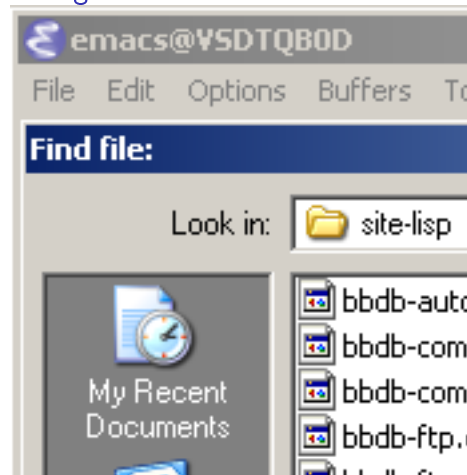


Configure system dependent aspects and user options

The mode comes pre-configured for a default installation of ANSYS 14.5 for Win64. If on other systems something is missing adjust

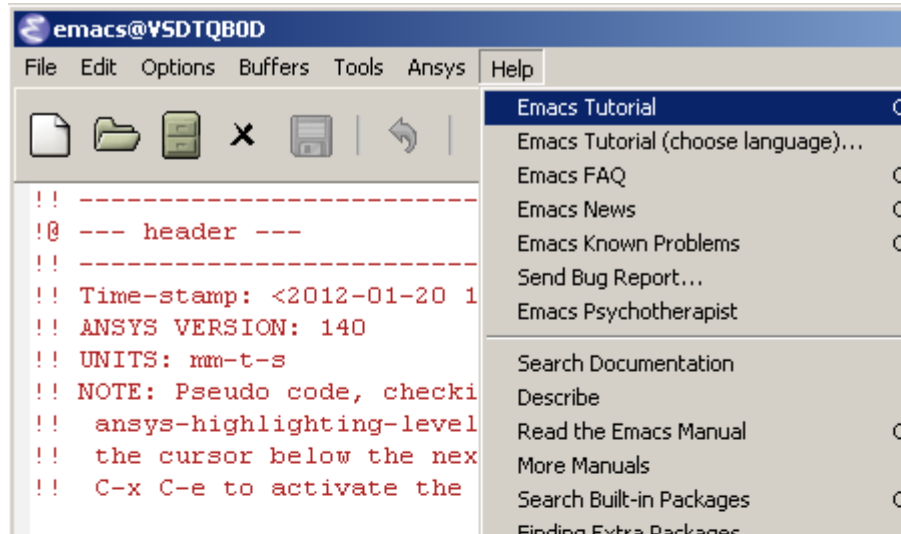
The well commented configuration file *default.el*

Or change the settings with Emacs' customisation system



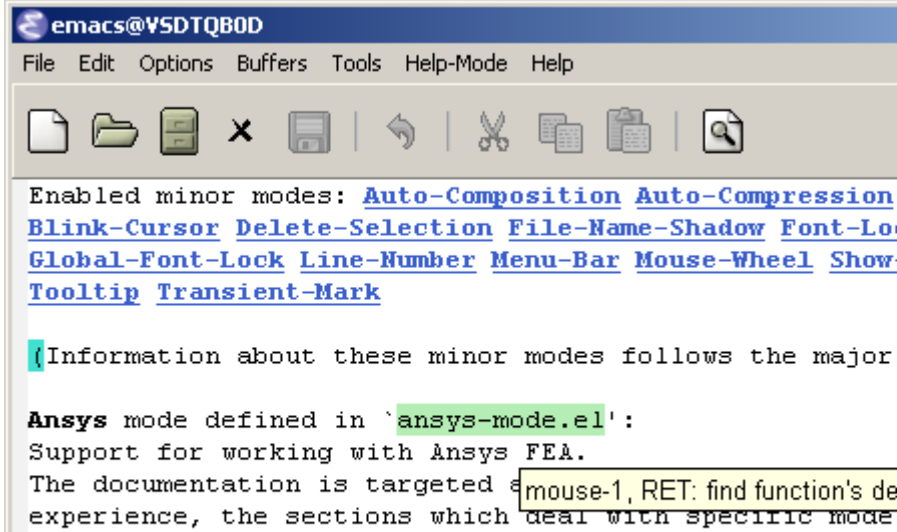
Get to know Emacs and its excellent documentation

Newcomers to Emacs should take the [guided online tour](#) to get a background of its capabilities and fire up the interactive tutorial (**C-h t**) which is translated to various languages.



Use the ANSYS-Mode built-in help

Please type **C-h m** to open the mode help, especially for ANSYS-Mode's usage and keybindings. At the beginning is also a brief introduction of basic Emacs concepts.



You might read further ANSYS-Mode documentation

Licensing and costs: This is free and open software, there are **no costs** and effectively **no restrictions** for you using Emacs and ANSYS-Mode also commercially. Both are under the **GPL, the Gnu Puplic License** described in the *LICENSE* file.

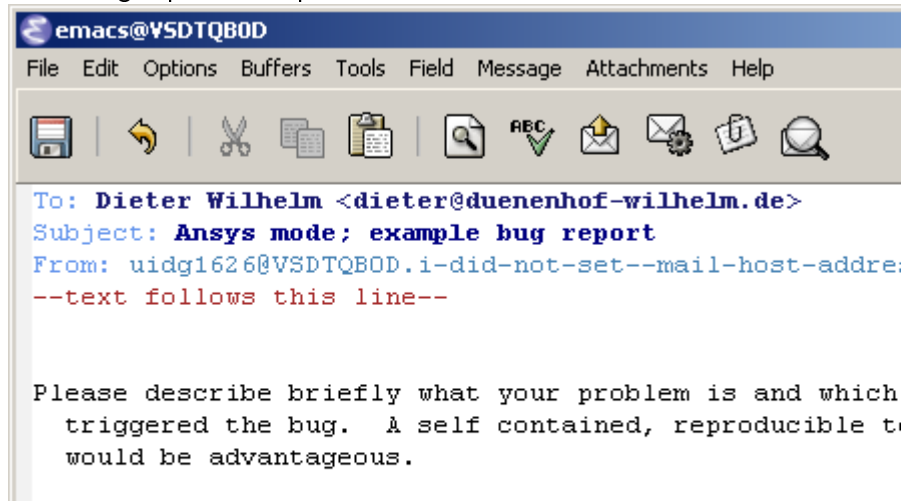
Installation: More detailed instructions are necessary if you are not using the mode bundled with Emacs for Windows. Please have a look in the *README* file. An online version of it represents **EmacsWiki's ANSYS-Mode page**.

Hands-on tutorial and reference: You will find this more in-depth documentation included in the mode's archives on **Google Code's download page** or **online**.

News and project history: They are placed in the mode's accompanying *NEWS* file

Search for help, report bugs and issues

Besides the documentation, have a look in the section [Issues](#) for bug reports at Google Code's site or send an [email](#) to the maintainer. Please use the ANSYS-Mode bug report functionality, which might provide helpful status information.



Use ANSYS-Mode appropriate to your needs

Basic APDL **Viewer**

Navigating in WB solver input files, discerning relevant information through highlighting, quickly analysing APDL commands with the built-in help or studying their detailed help in your browser.

Earnest APDL **Editor**

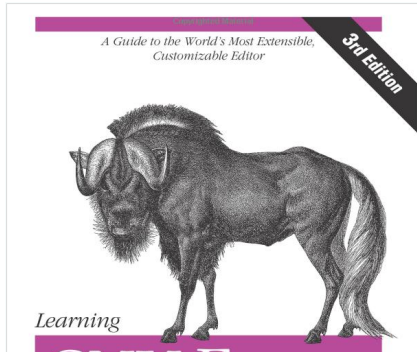
Specific shortcut keybindings, outlining, code templates, completions, auto-indentation, abbreviations, auto-insertion.

Advanced APDL **Environment**

Solver communication/feedback - hybrid between coding and debugging (GNU/Linux only), retrieving license states, error file viewing, abort file handling, extending APDL templates, ...

Last slide of the ANSYS-Mode tutorial

Hint for the curious:

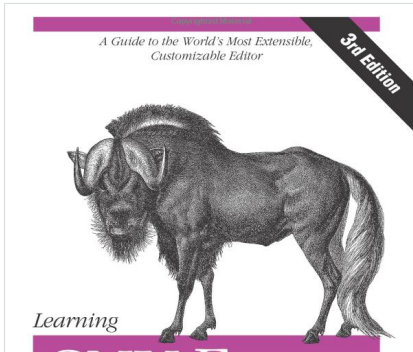


Last slide of the ANSYS-Mode tutorial

Thank you for your time
getting acquainted with
ANSYS-Mode!

Have fun...

Hint for the curious:



Classical learning
curves for some
common editors



11-17-93