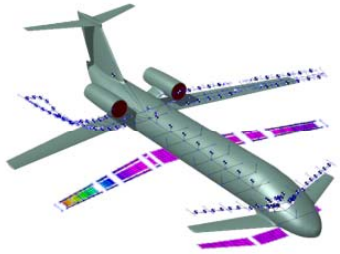
NeoCASS Tutorial

How to run a flutter analysis

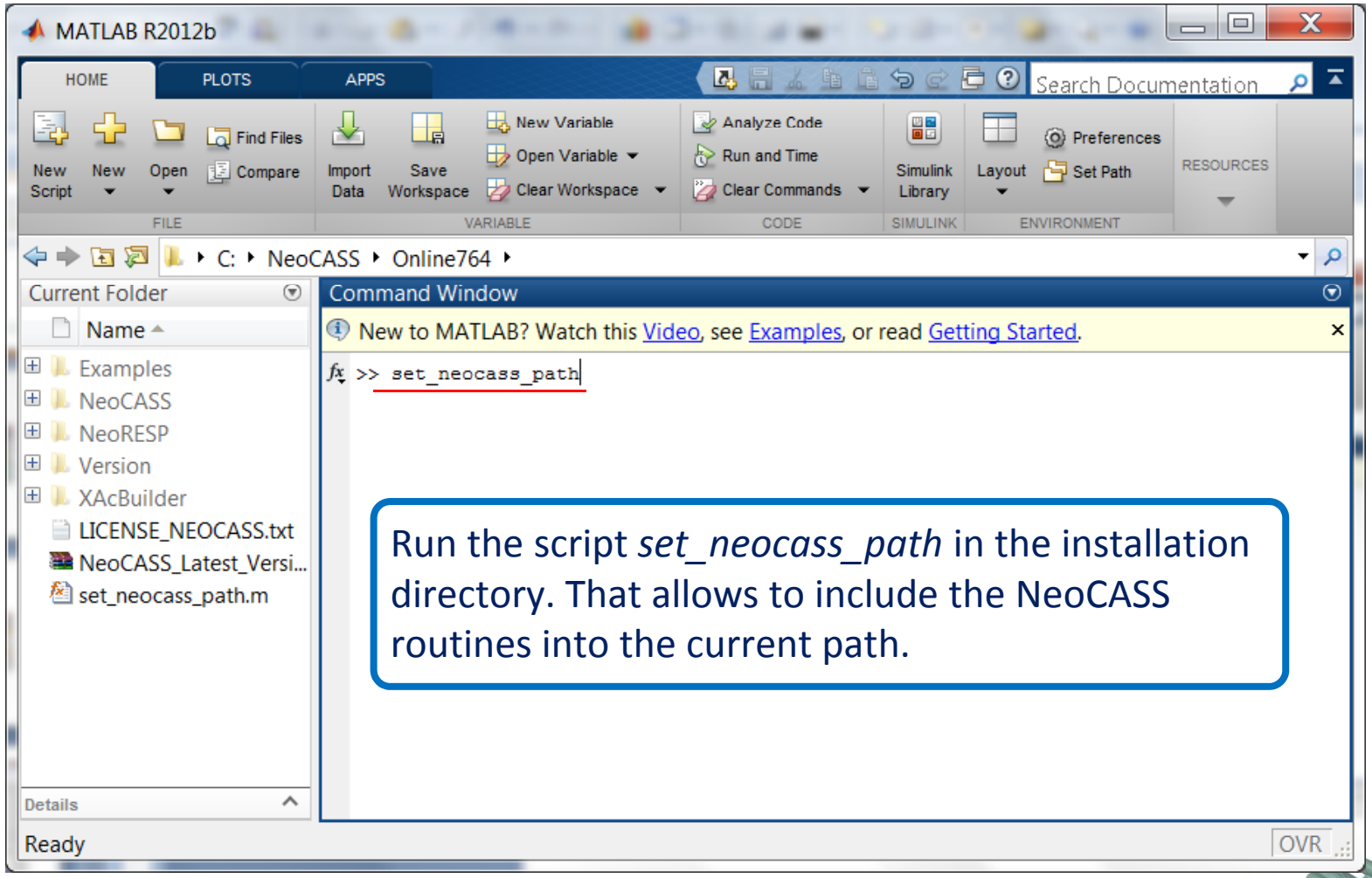
Version 2.2(.790)

August 2017

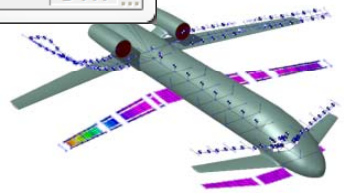
Outline



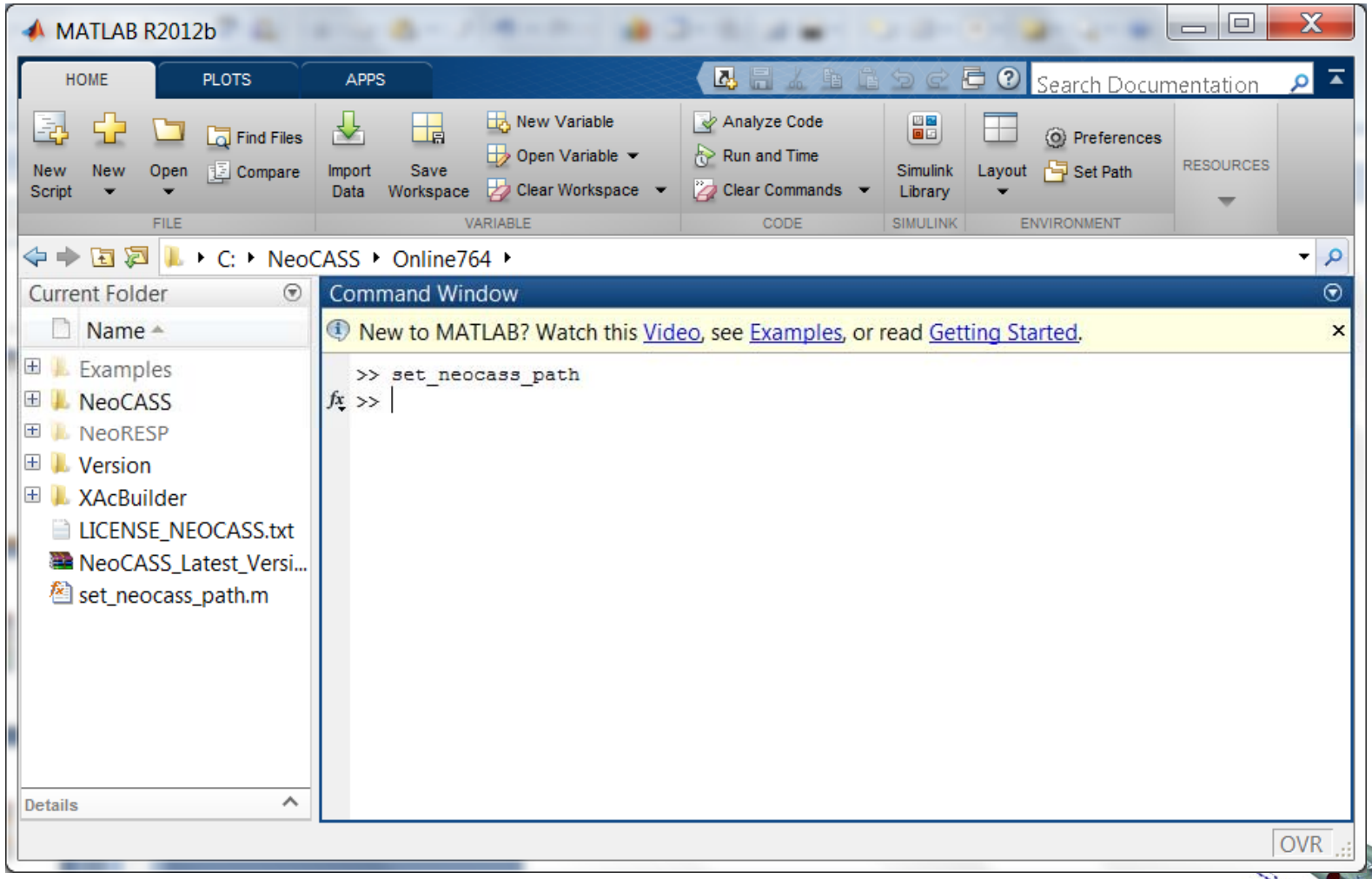
NeoCASS path definition

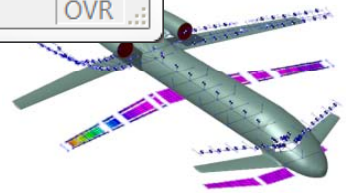


Run the script *set_neocass_path* in the installation directory. That allows to include the NeoCASS routines into the current path.

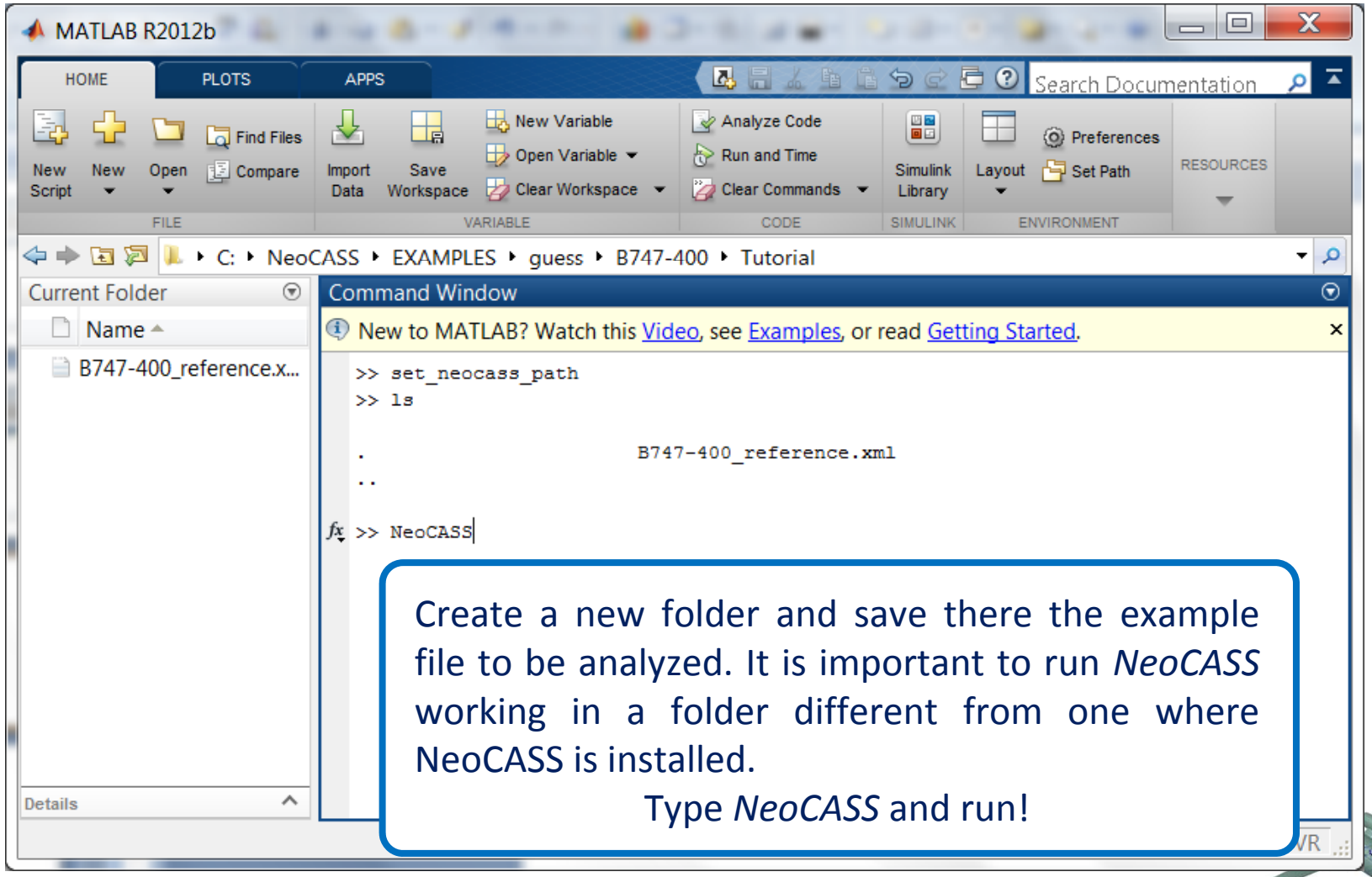


NeoCASS path definition



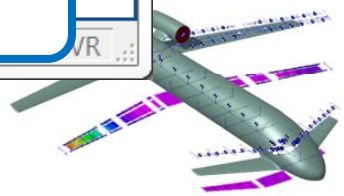


Running NeoCASS from the working directory

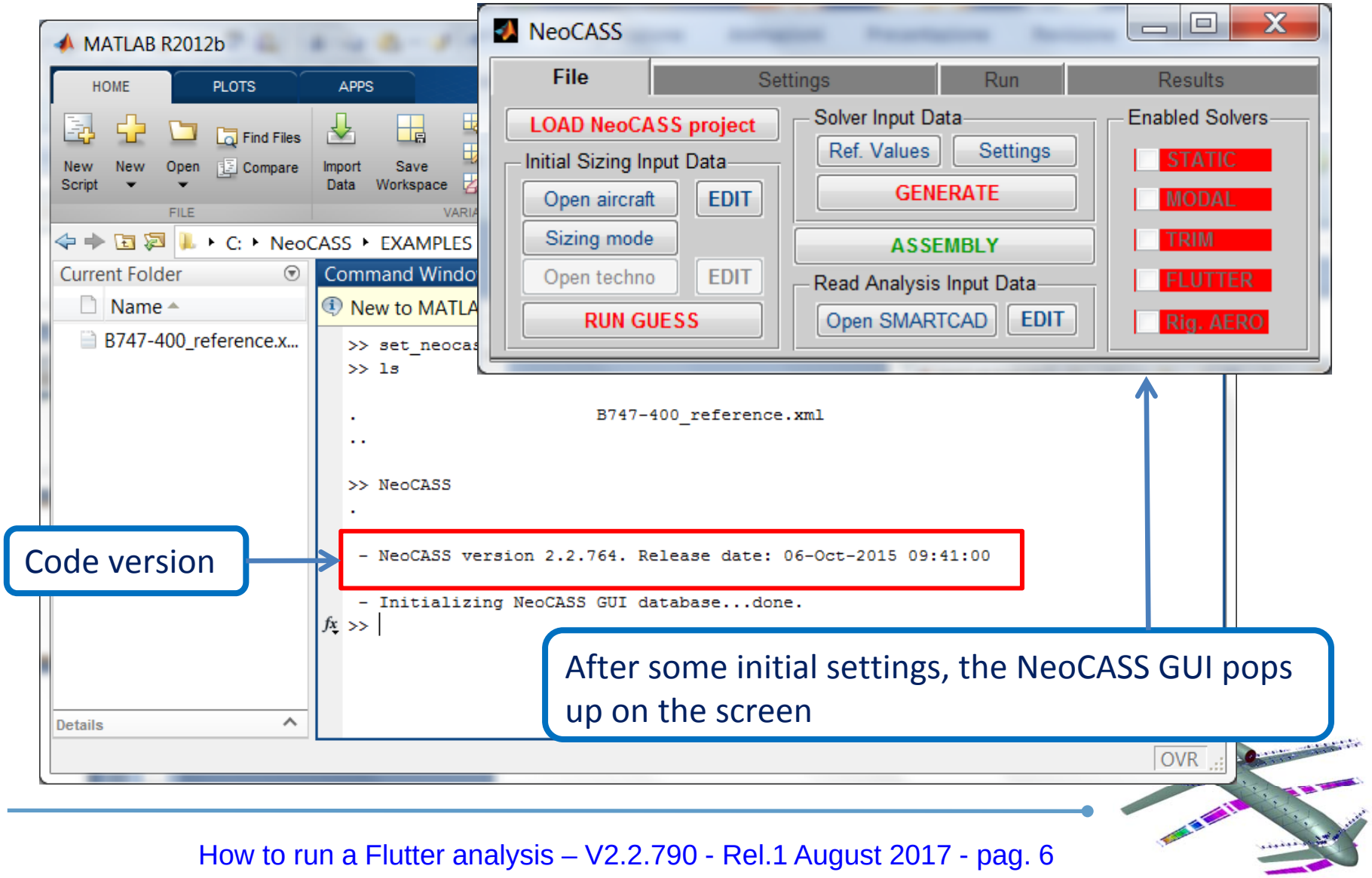


Create a new folder and save there the example file to be analyzed. It is important to run *NeoCASS* working in a folder different from one where NeoCASS is installed.

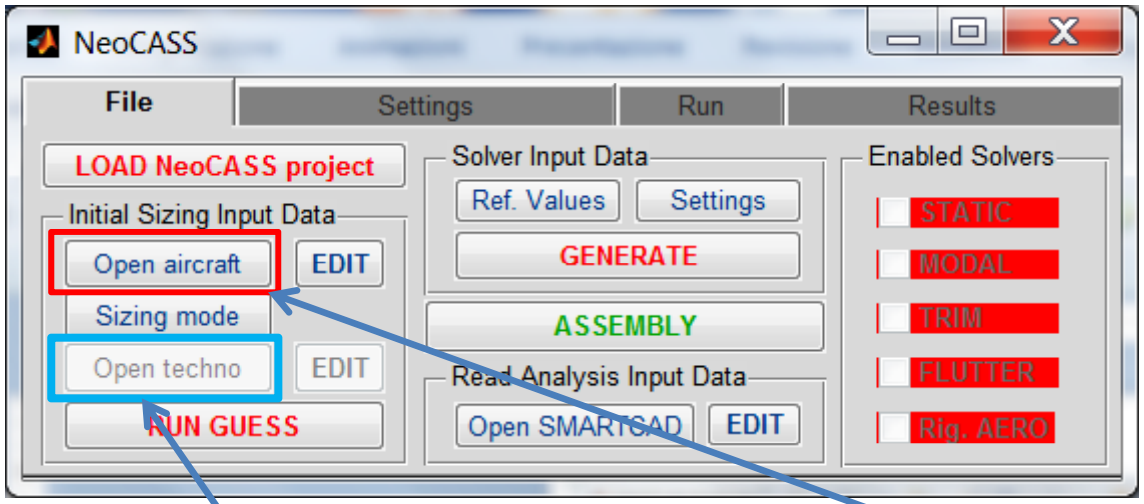
Type *NeoCASS* and run!



NeoCASS GUI Panel

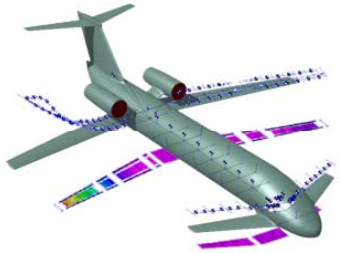


1st STEP: loading the XML file

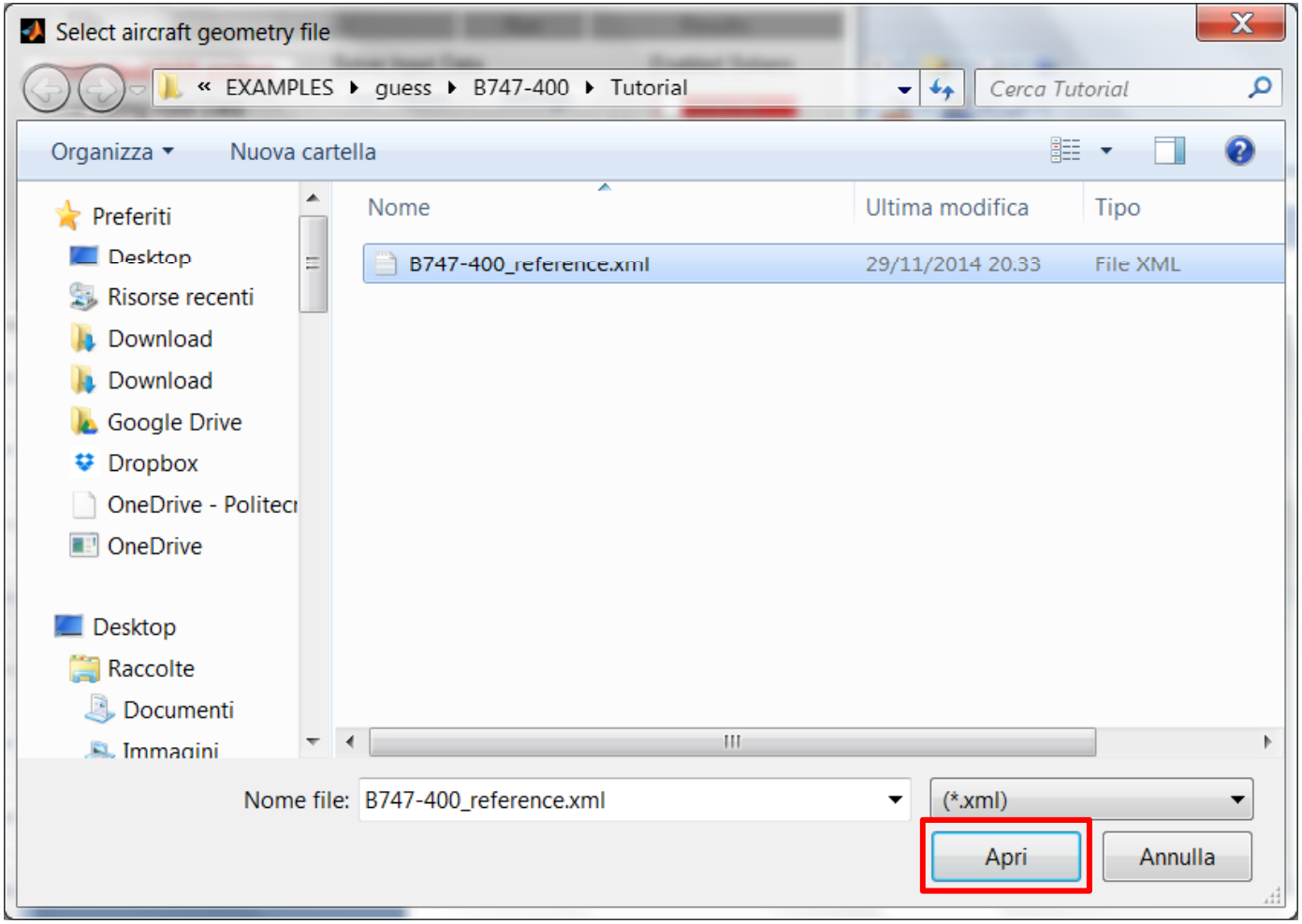


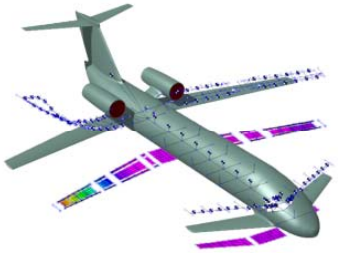
Click *Open aircraft* button to load the XML file

The *Open techno* button is not active when the technology info are already included into XML file.

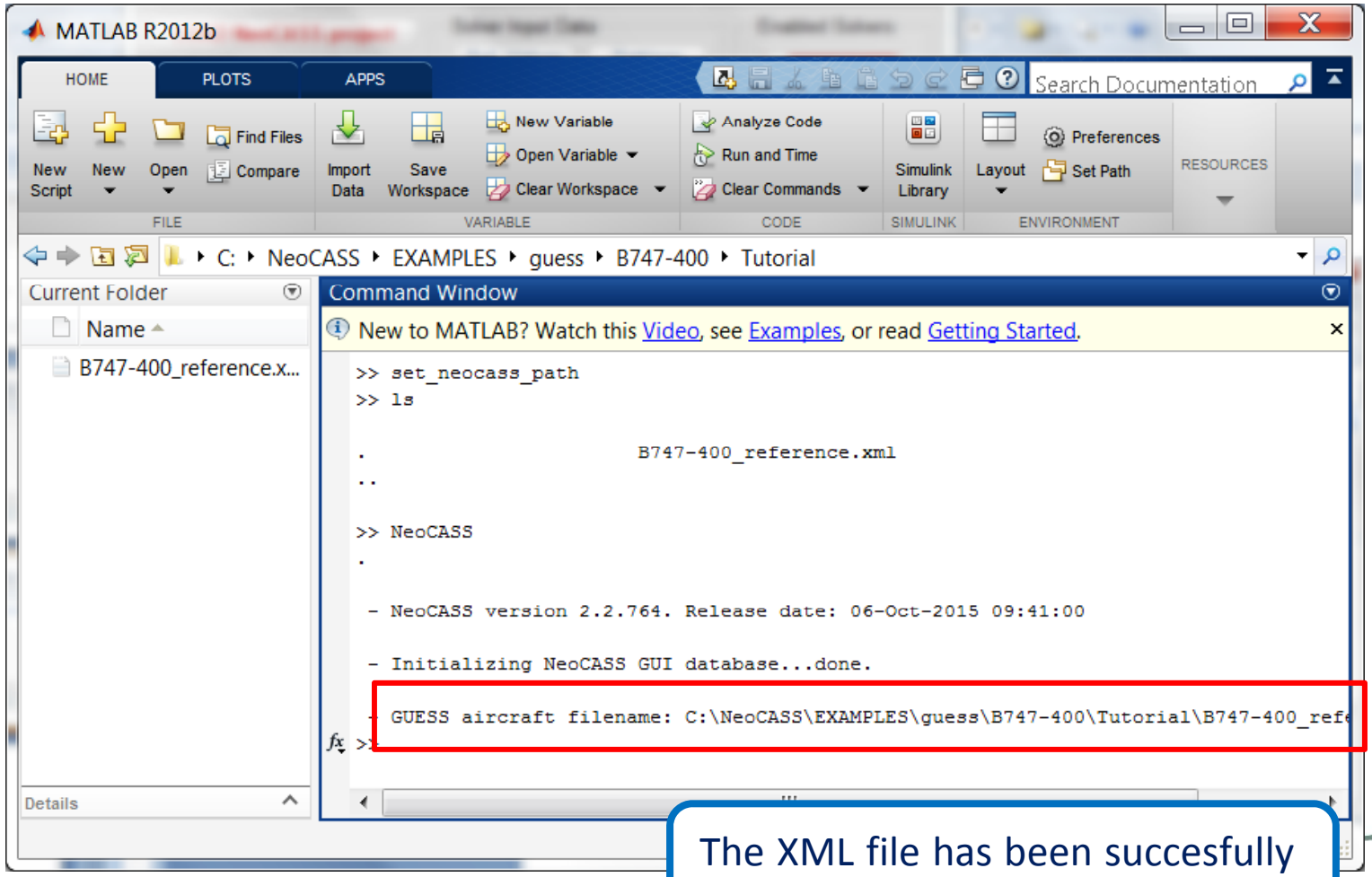


1st STEP: loading the XML file

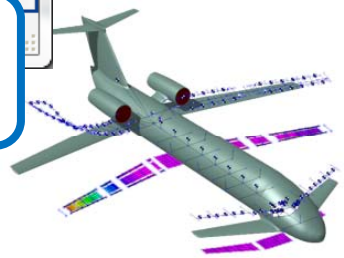




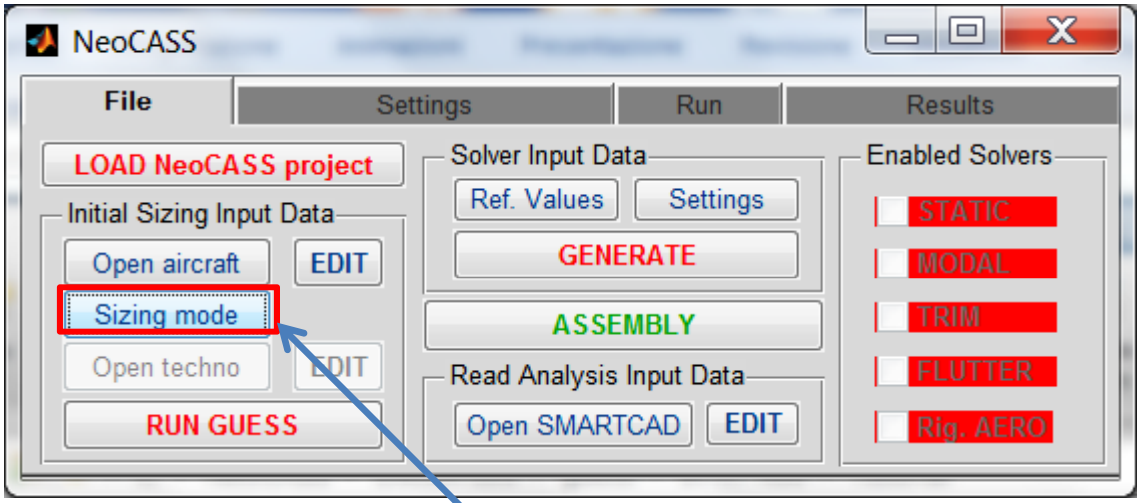
1st STEP: loading the XML file



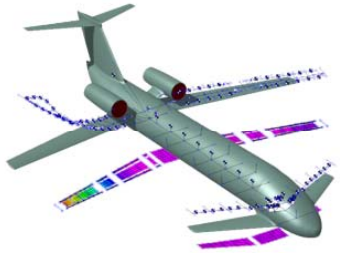
The XML file has been succesfully found and loaded.



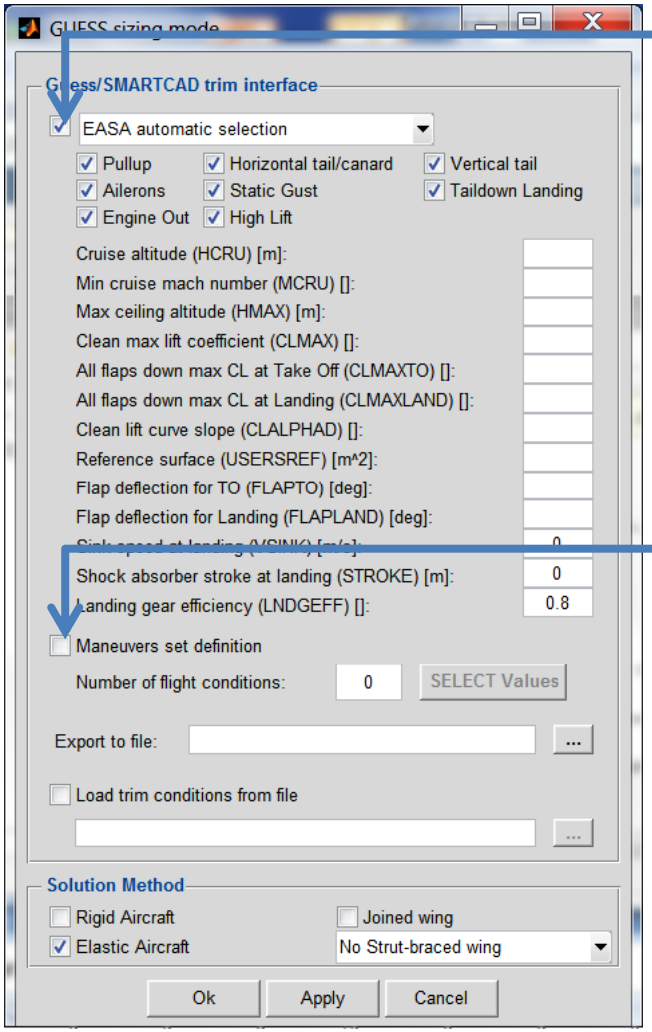
2nd STEP: Selecting the sizing mode



Click the *Sizing mode* button to select the sizing loads

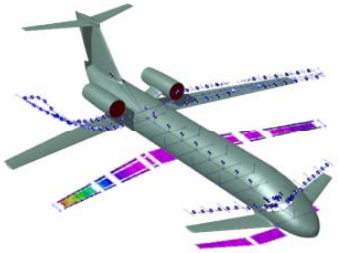


2nd STEP: Selecting the sizing mode

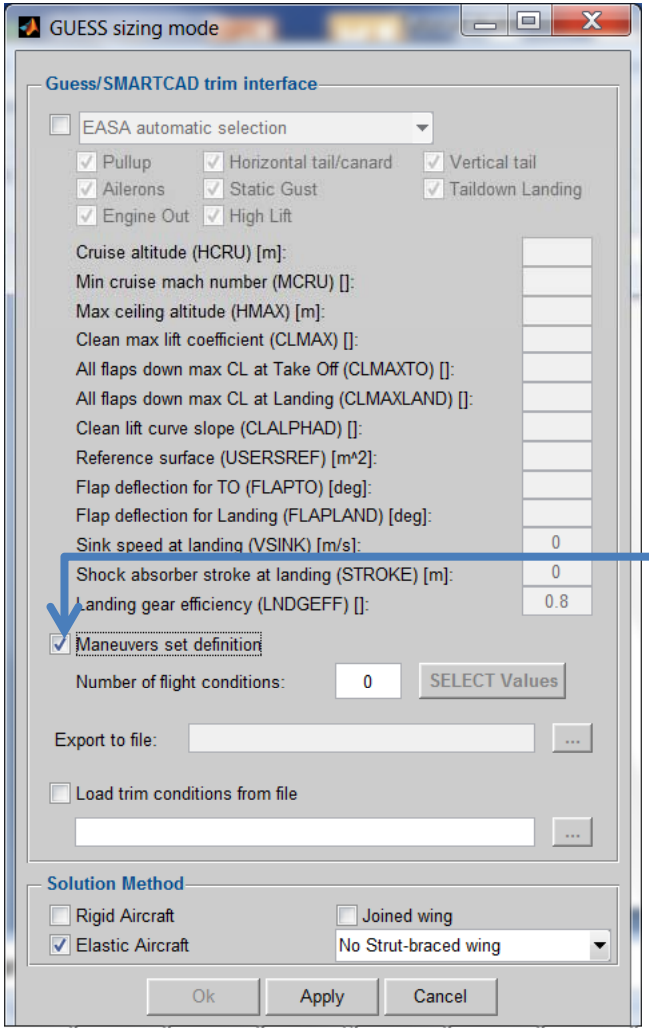


To automatically generate the load conditions on the basis of certification rules

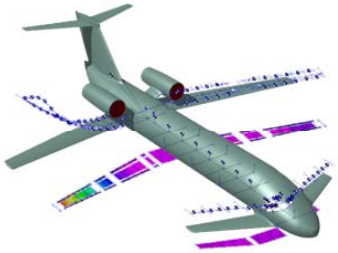
To impose user-defined load conditions. This option is suggested for new examples.



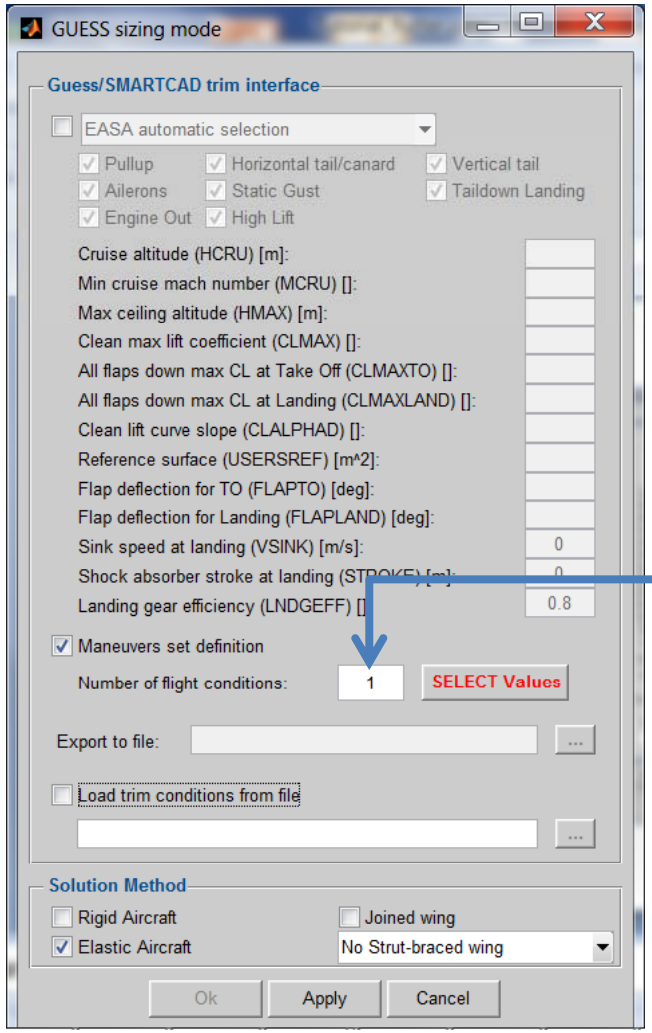
2nd STEP: Selecting the sizing mode



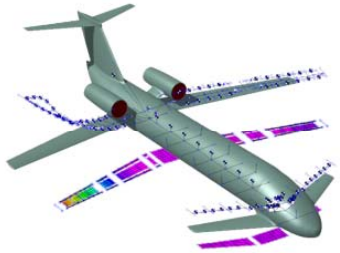
Using a single user defined maneuver is highly recommended the first time you analyze a new aircraft.



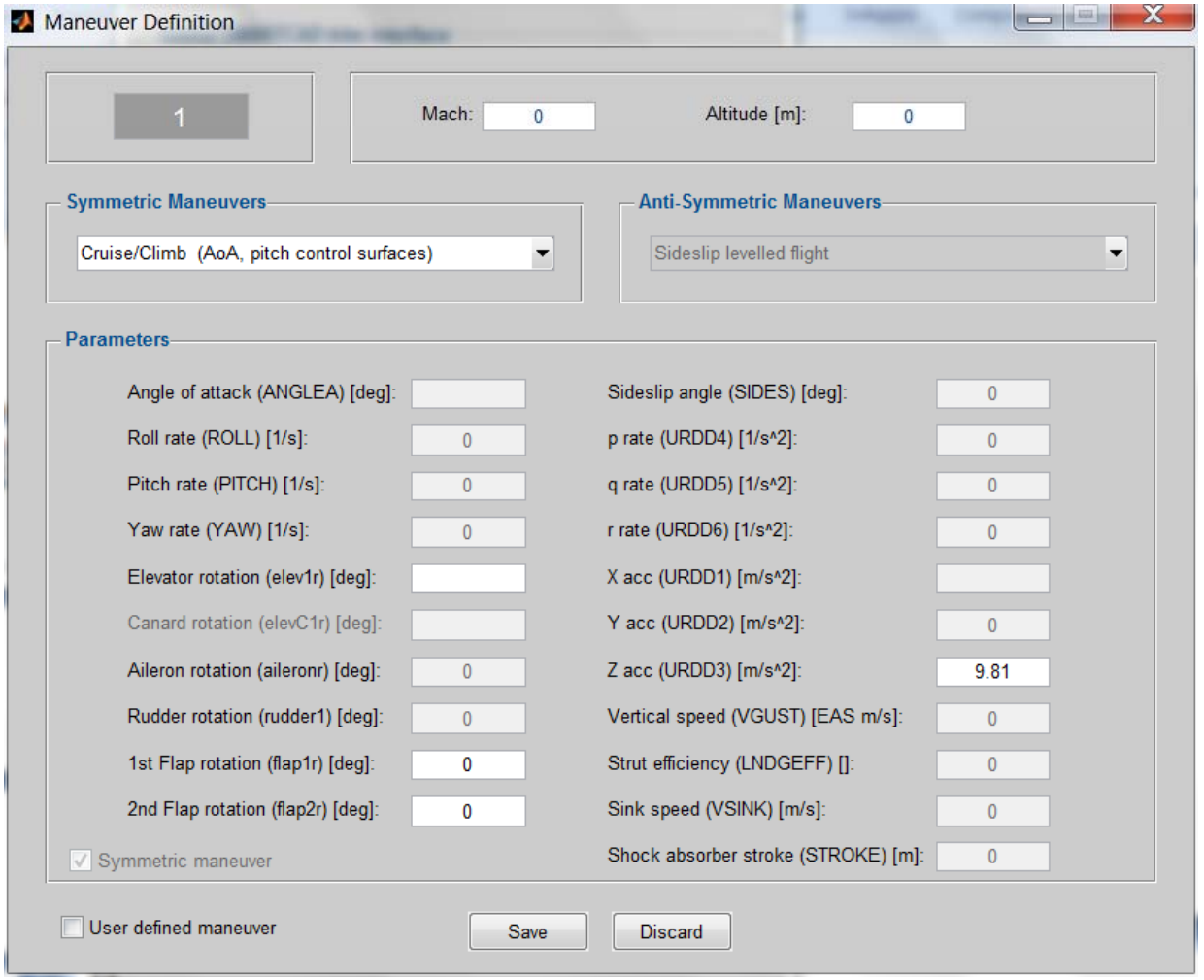
2nd STEP: Selecting the sizing mode

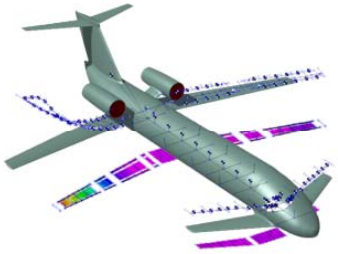


A single load condition is imposed.
Click on *SELECT Values …*

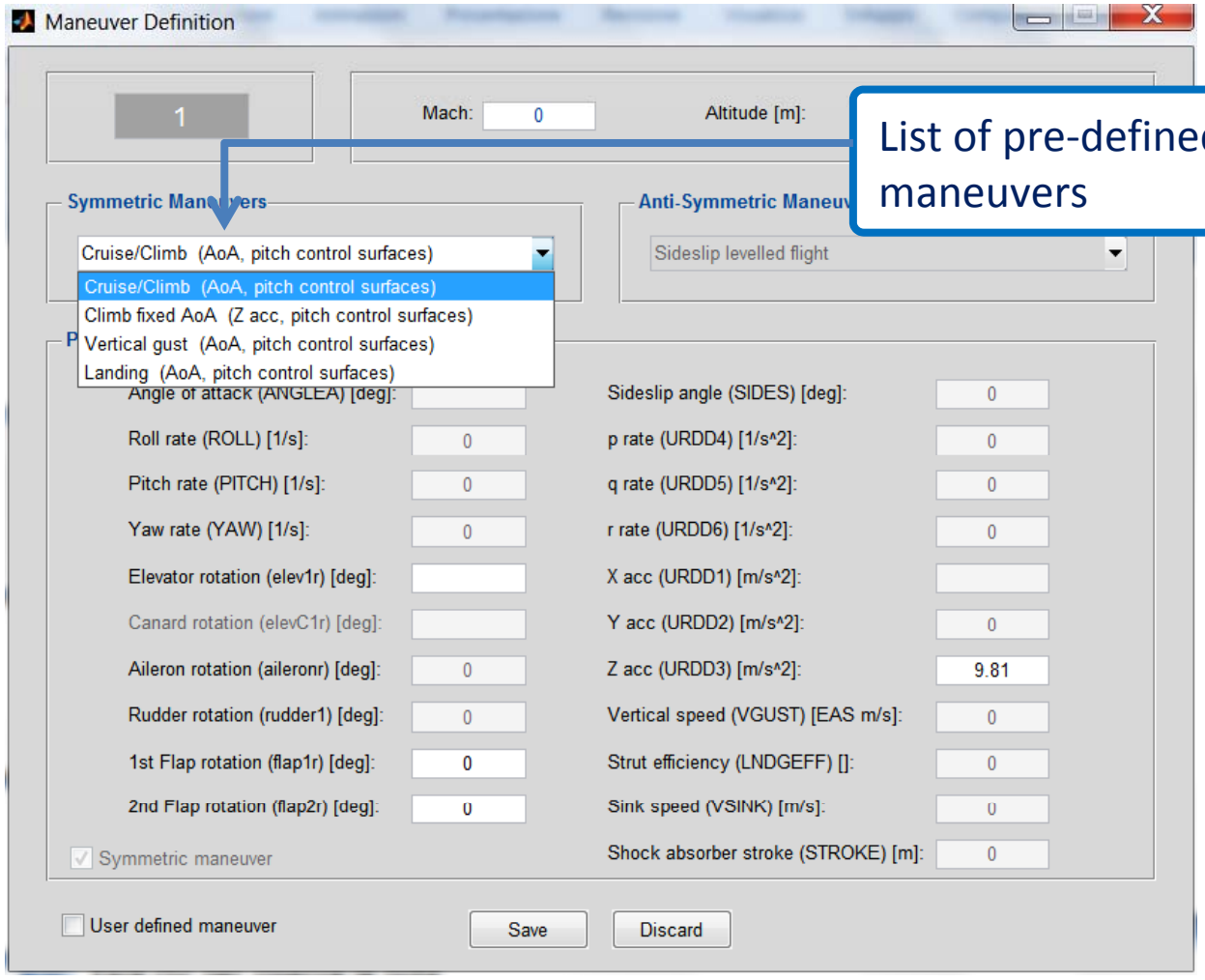


Selection of the trim maneuvers

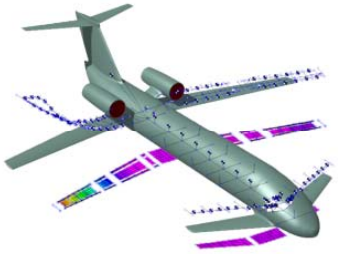




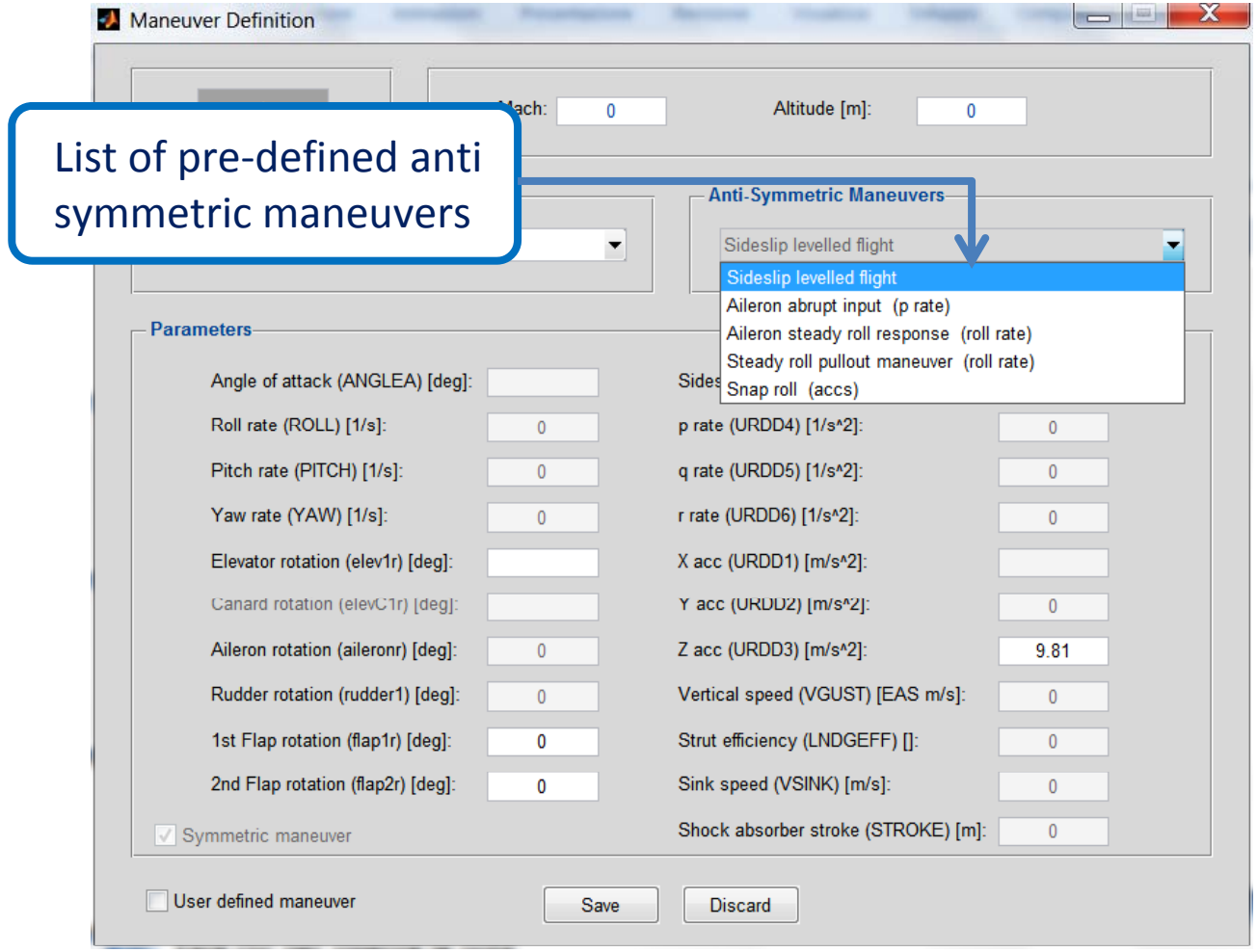
Selection of the trim maneuvers

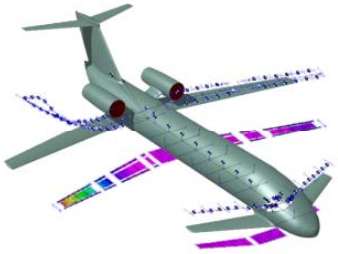


List of pre-defined symmetric maneuvers

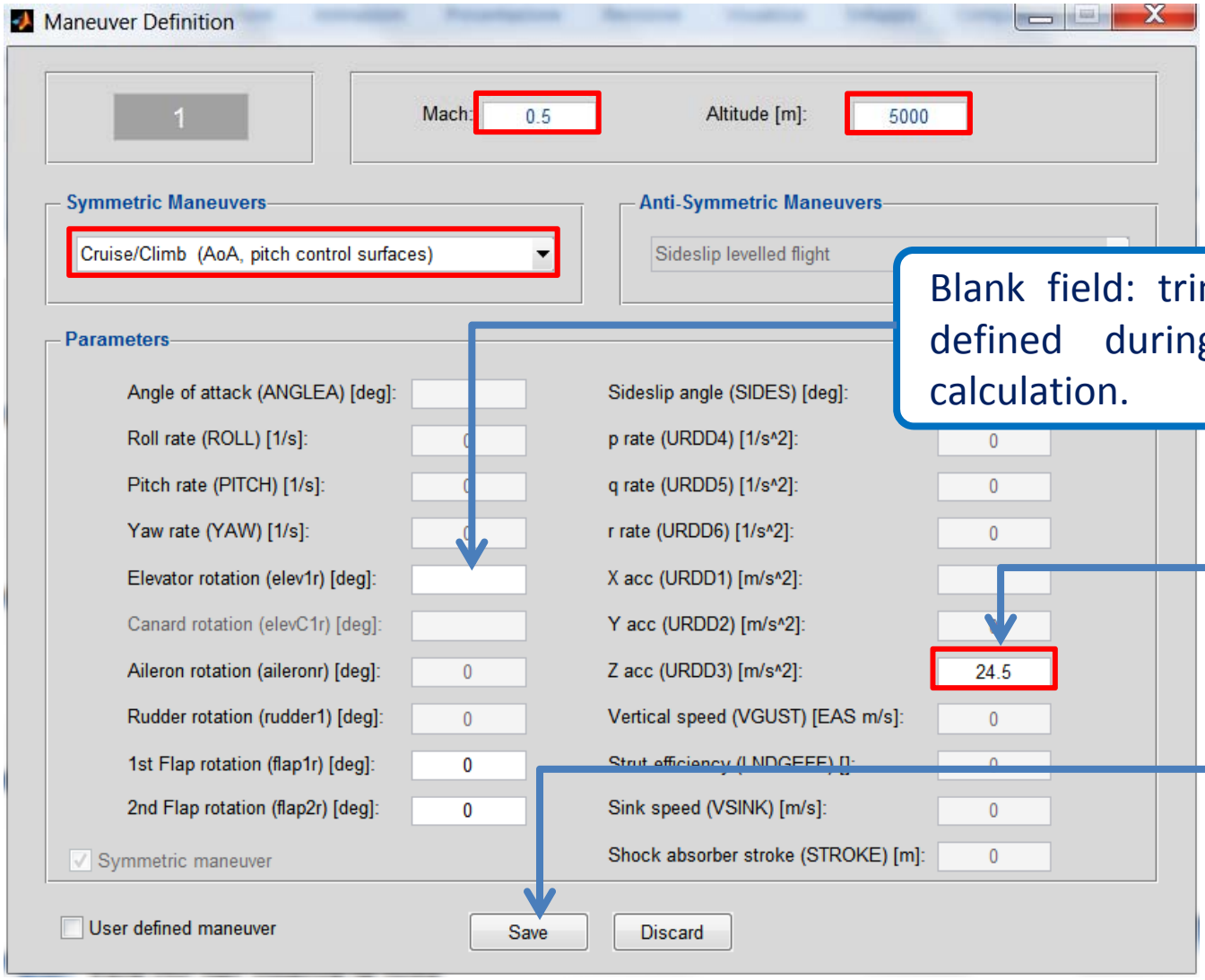


Selection of the trim maneuvers





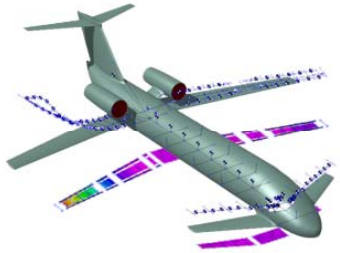
Definition of a single pull-up maneuver at +2.5 g



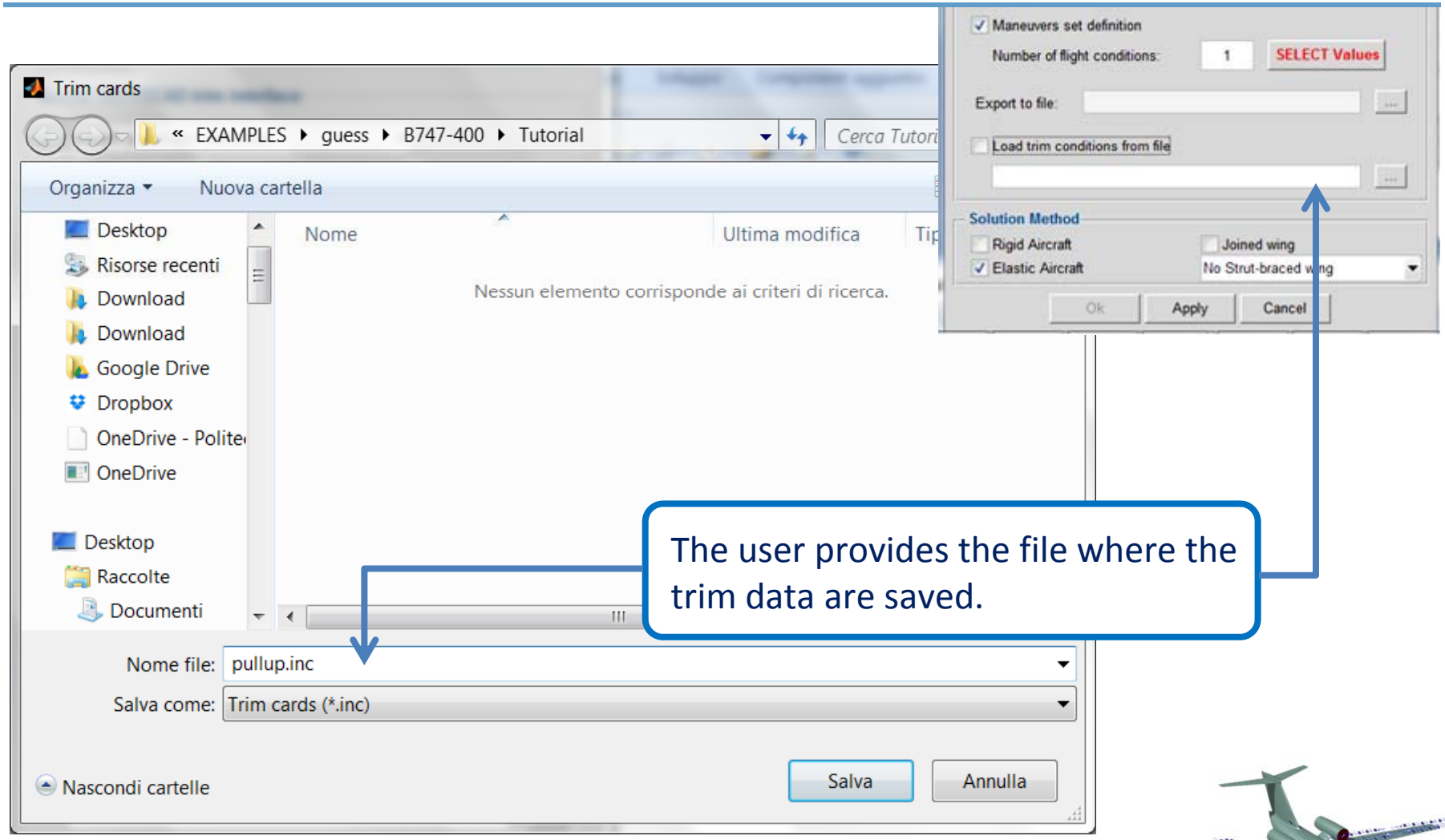
Blank field: trim variable to be defined during the trimming calculation.

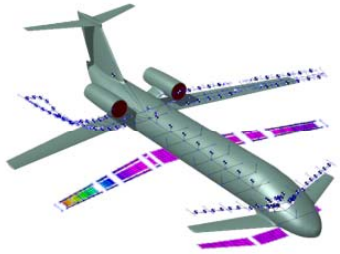
Z acceleration, about *2.5g*

Save trim data in a file

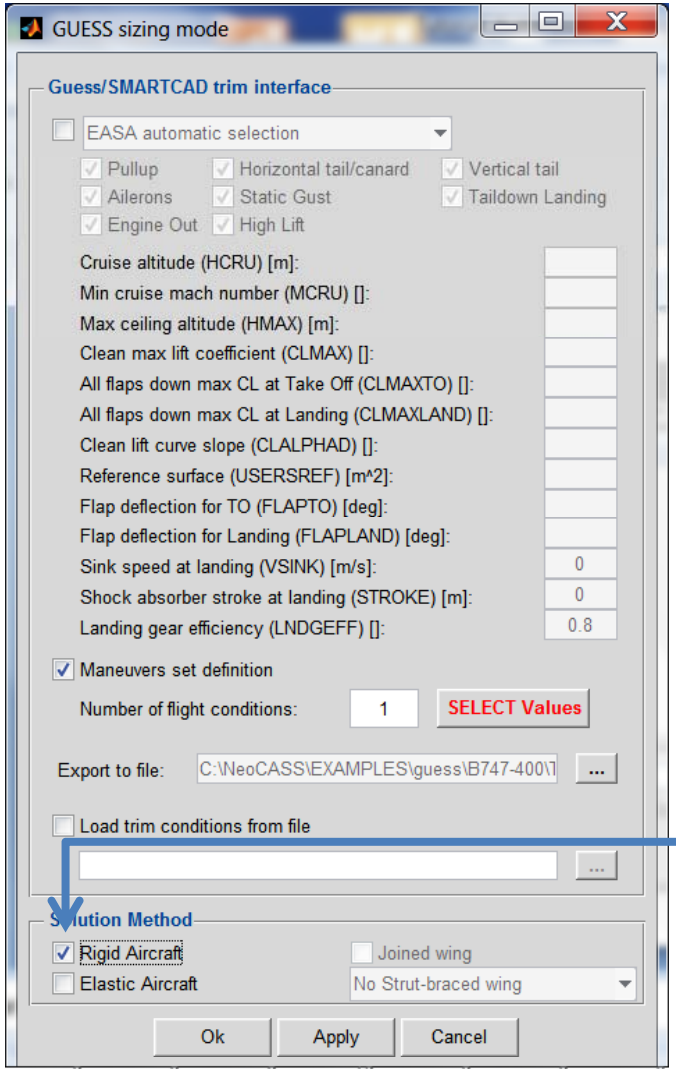


Saving the trim conditions

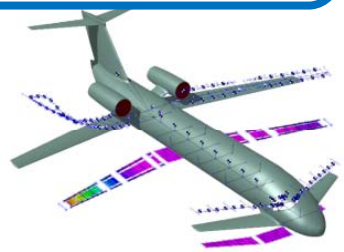




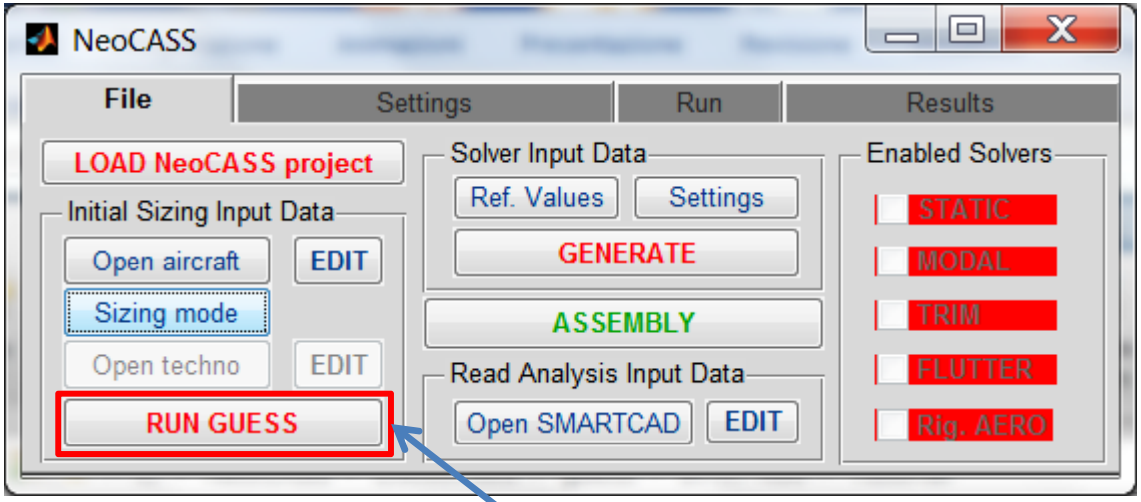
Selecting the sizing mode



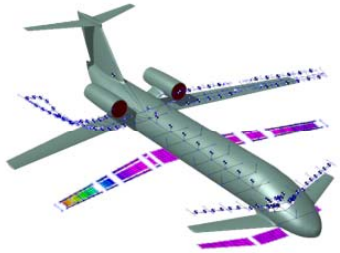
Two solution modes are available: force method (*Rigid Aircraft*) and displacement method (*Elastic Aircraft*). The second option is compulsory in case of non-conventional configurations and multiple mass configurations. After this choice, press *OK* button.



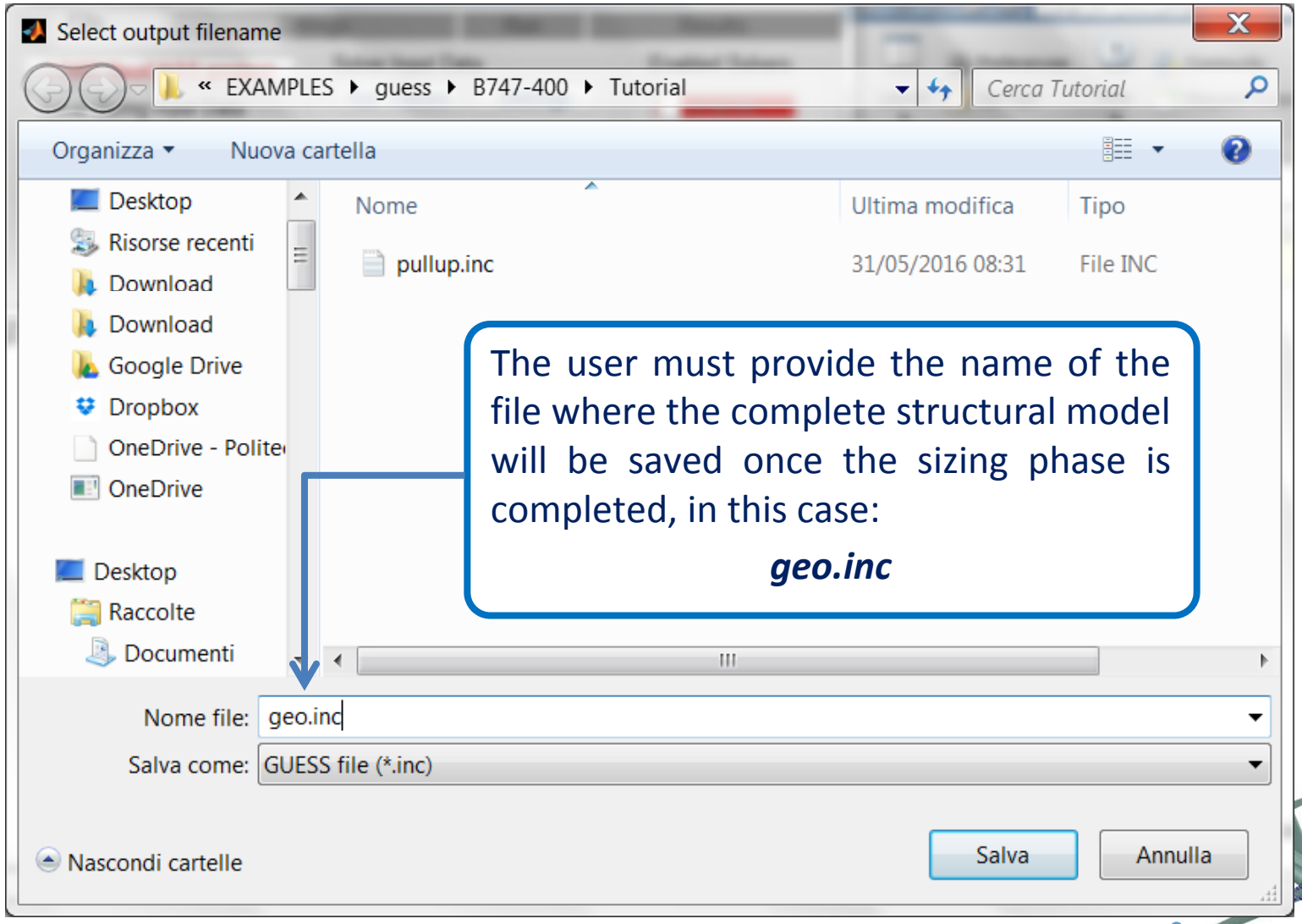
Running GUESS

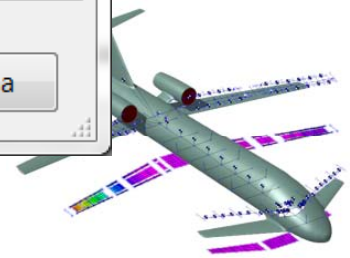


Press *RUN GUESS* button to run Guess module

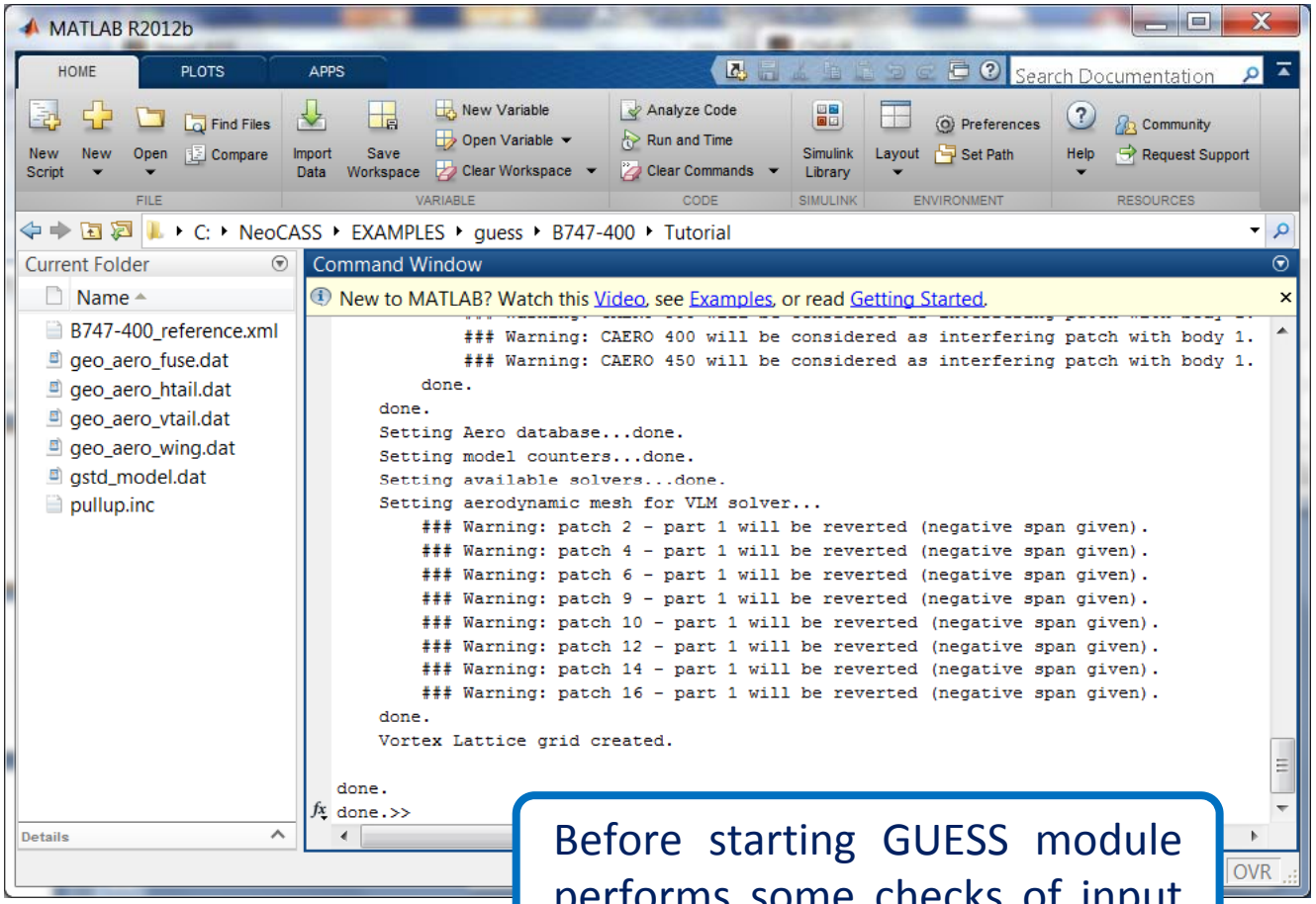


Running GUESS

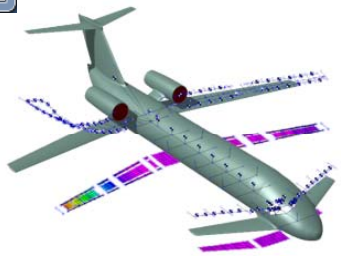




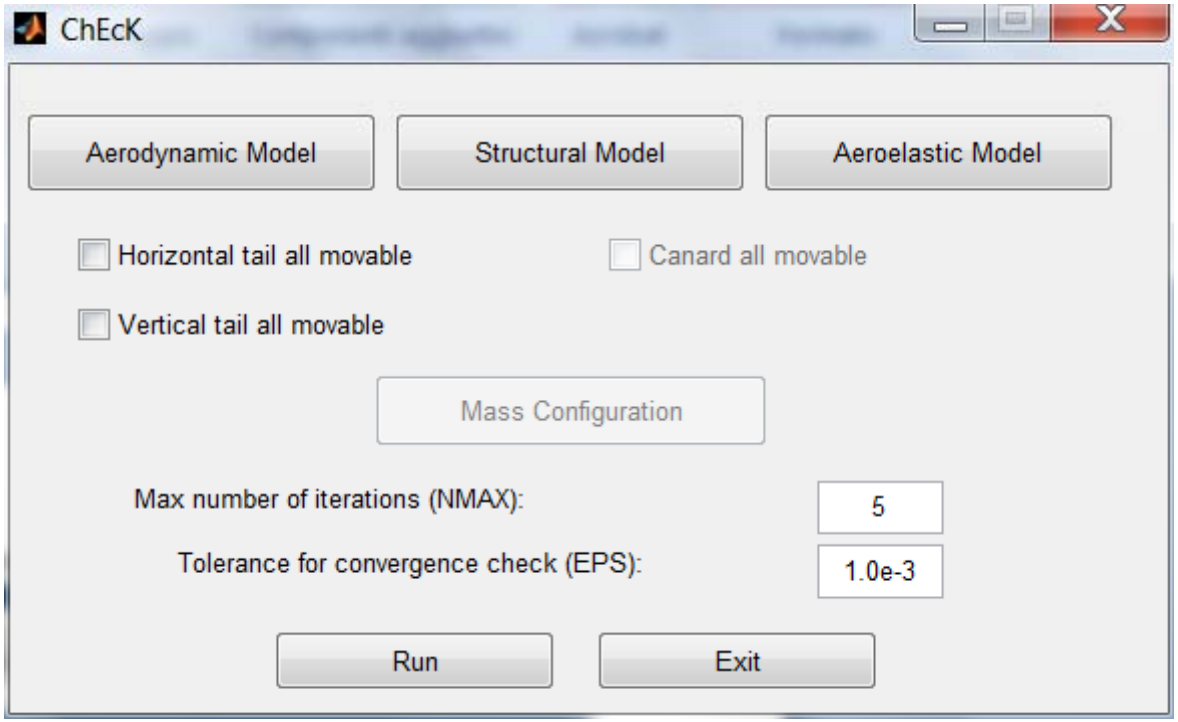
Running GUESS



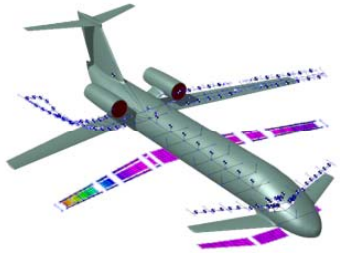
Before starting GUESS module performs some checks of input data consistency



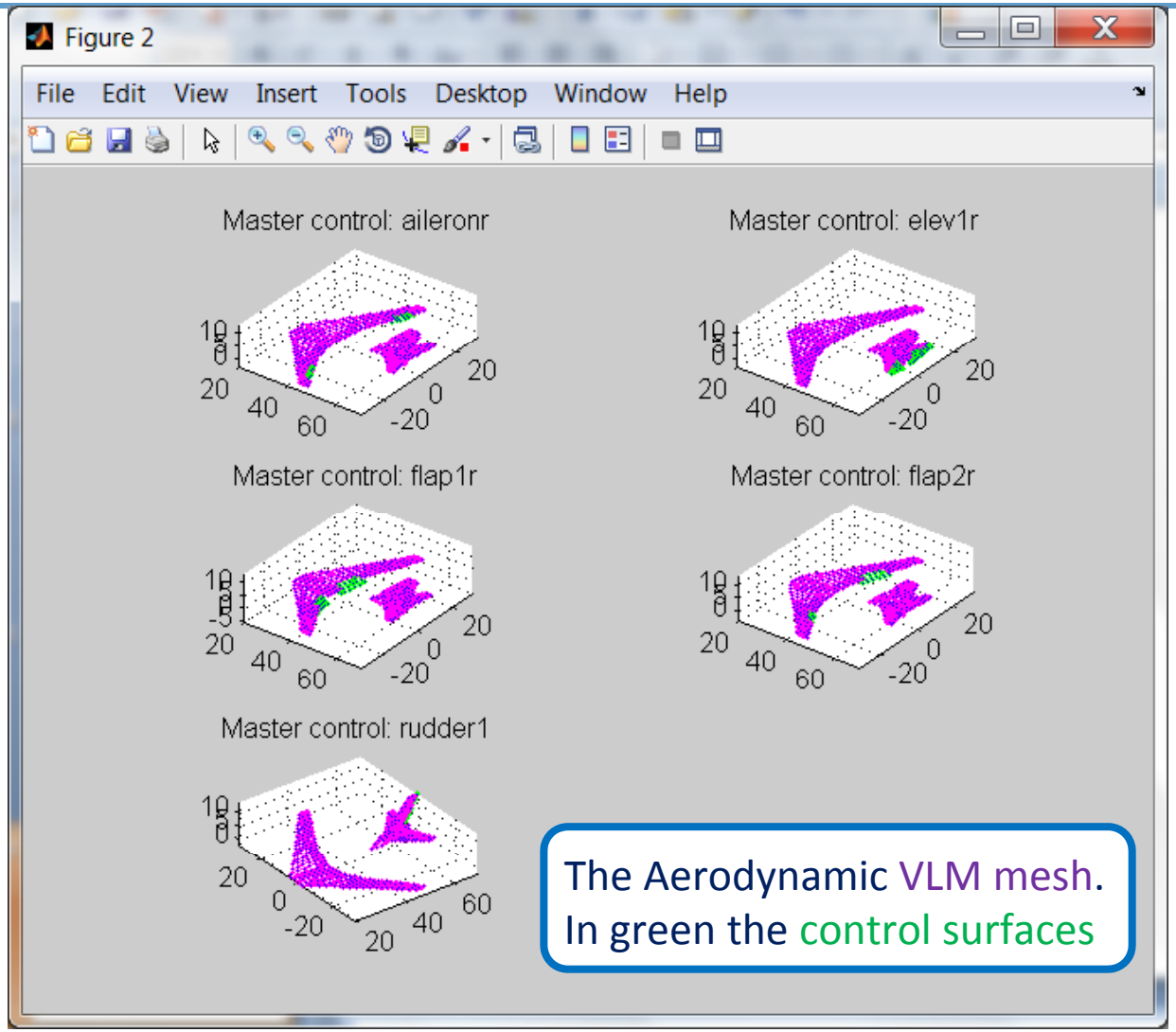
Running GUESS: the ChEcK window

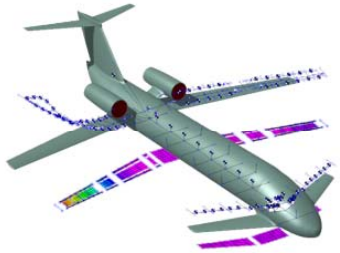


The ***ChEcK*** window allows the user to check the structural, aerodynamic and aeroelastic meshes, as well the selection of different mass configurations (Elastic Aircraft only)

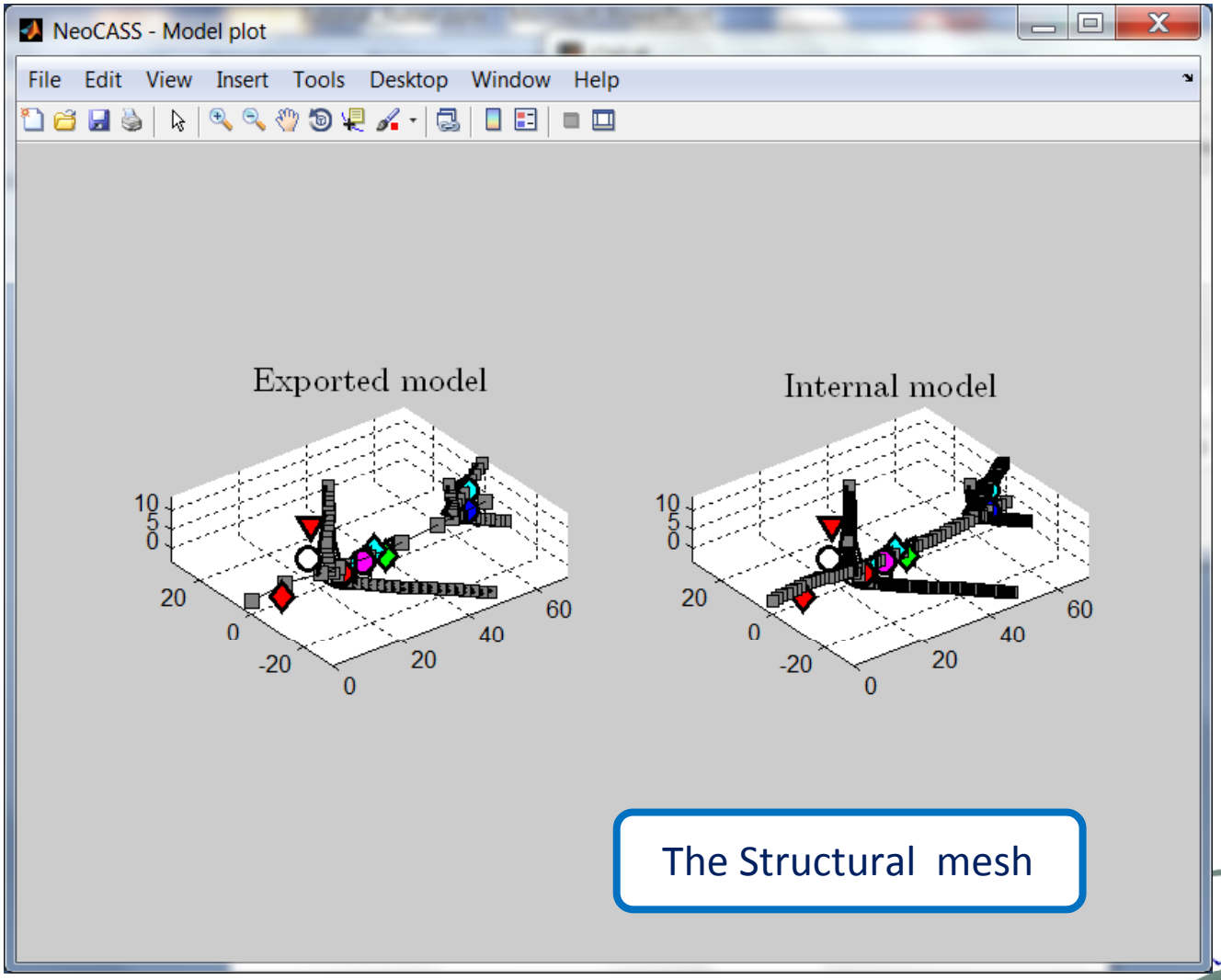


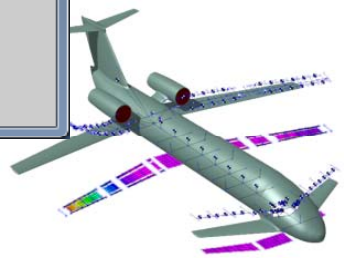
Running GUESS: the ChEcK window



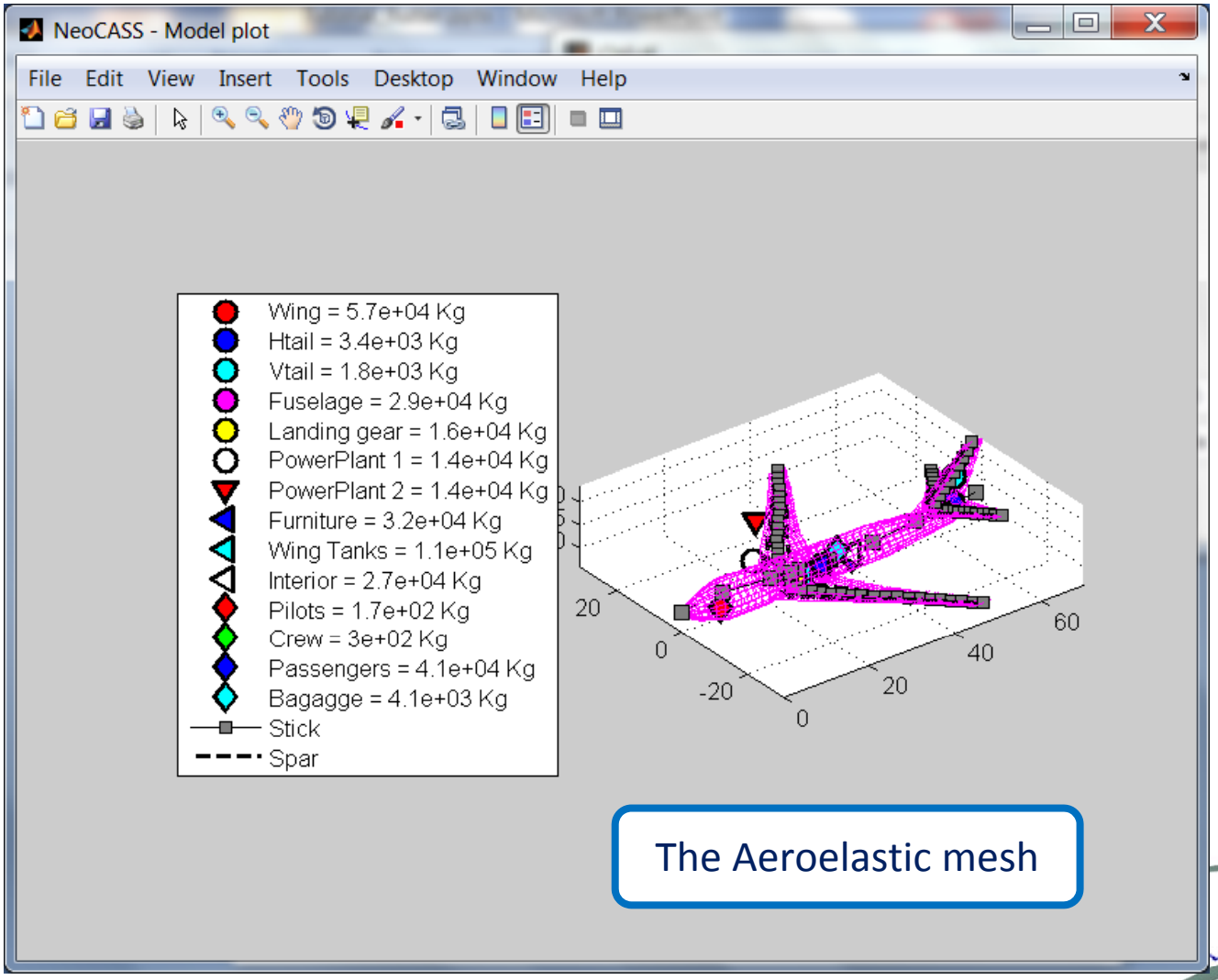


Running GUESS: the ChEcK window

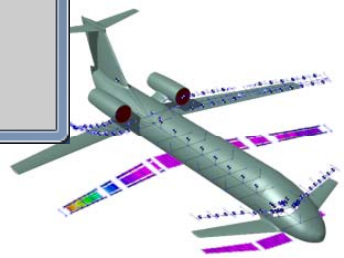




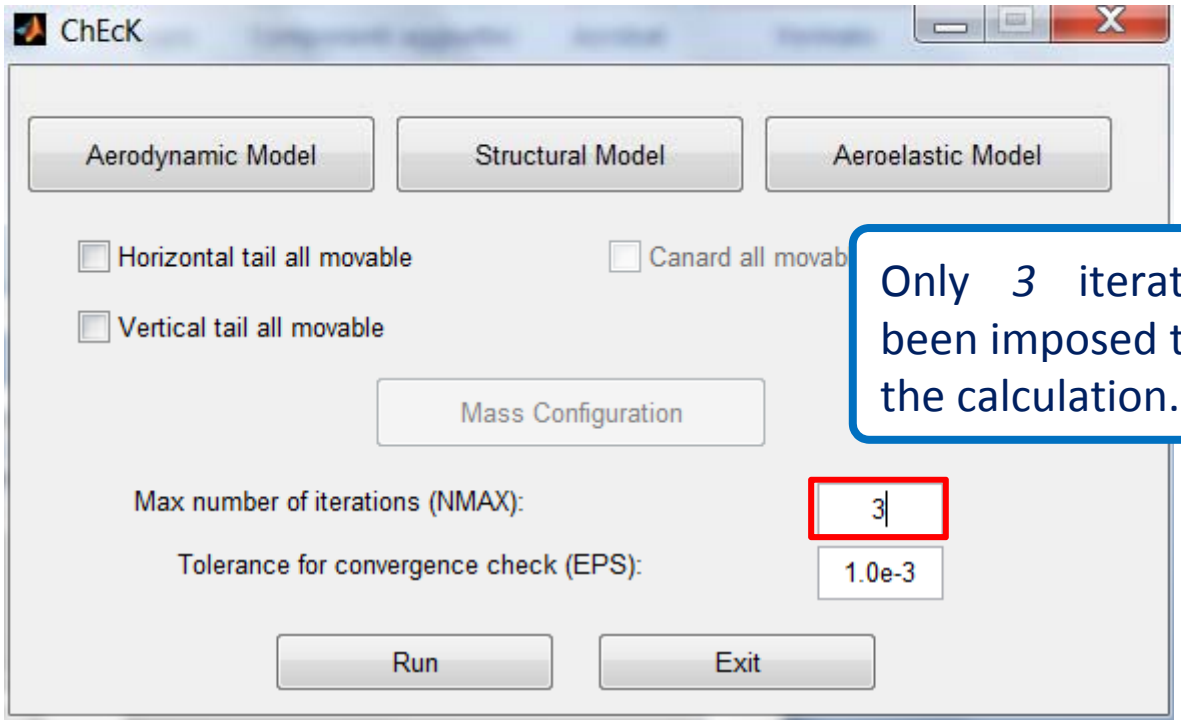
Running GUESS: the ChEcK window



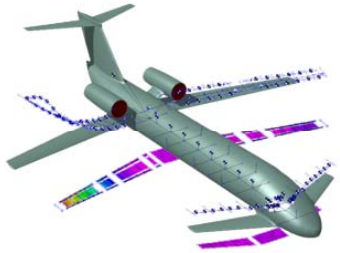
The Aeroelastic mesh



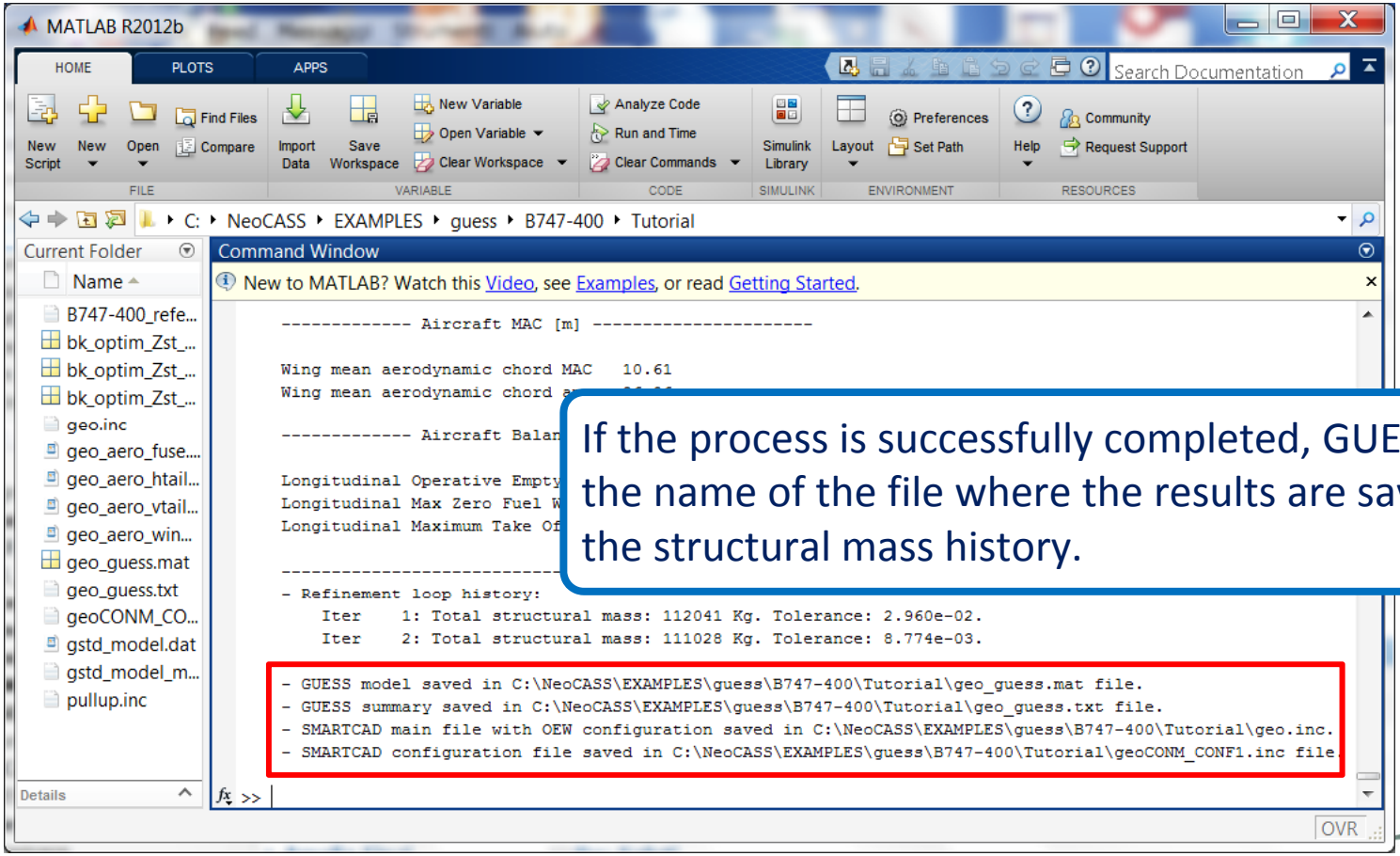
Running GUESS: the ChEcK window



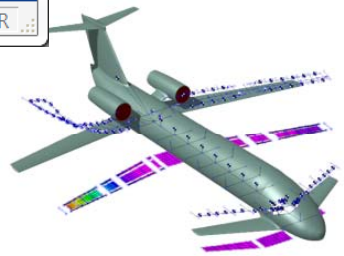
Only *3* iterations have been imposed to speed up the calculation.



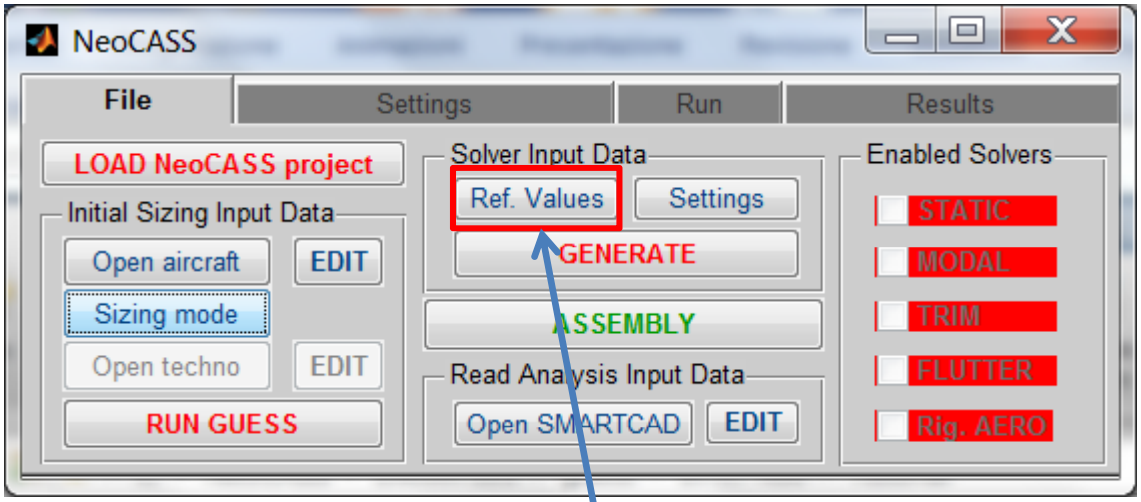
Running GUESS



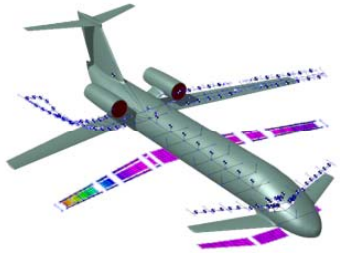
If the process is successfully completed, GUESS outputs the name of the file where the results are saved and the structural mass history.



Definition of the REFERENCE quantities



Press the *Ref. Values* button to define the reference quantities used for the calculation of many aeroelastic quantities.



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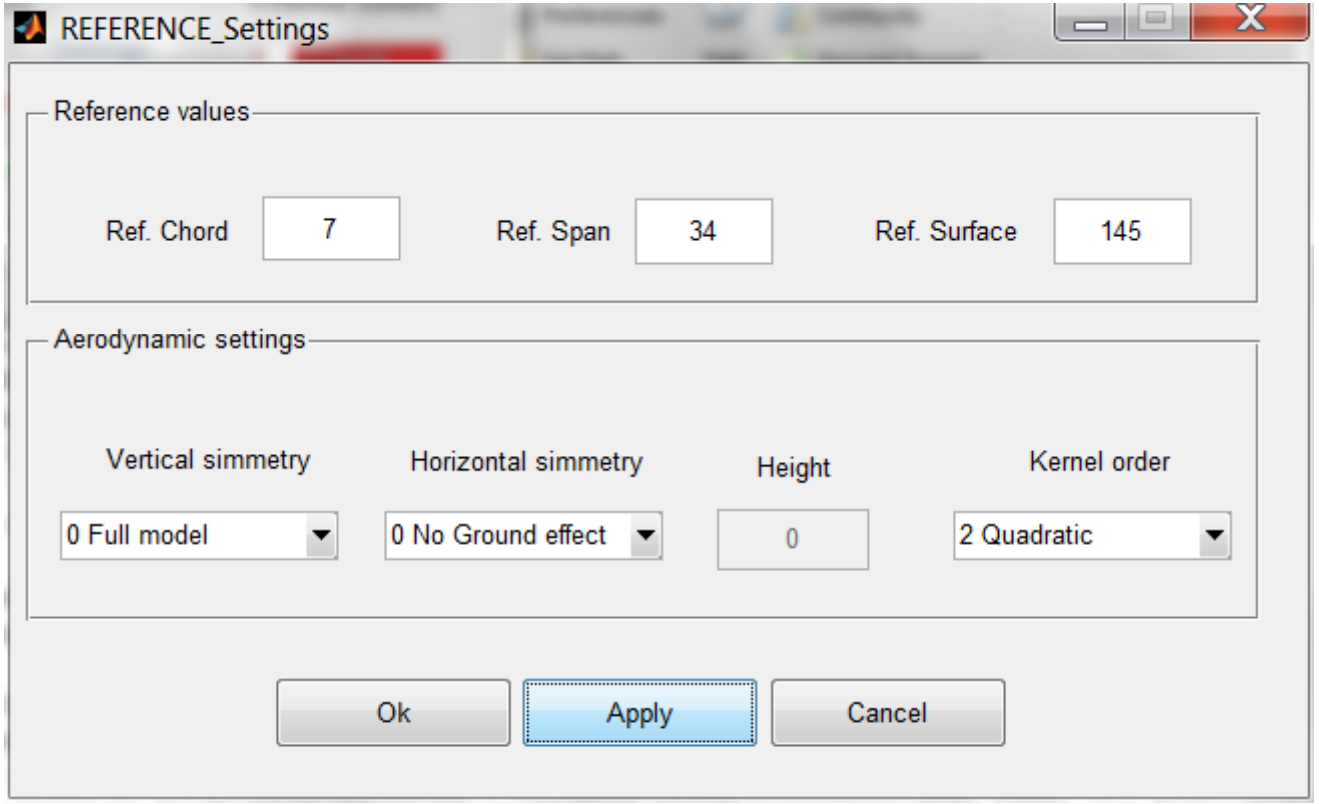
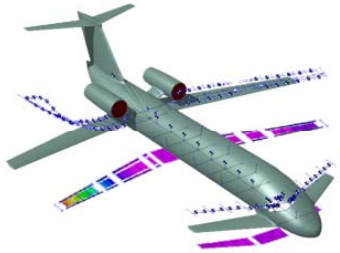
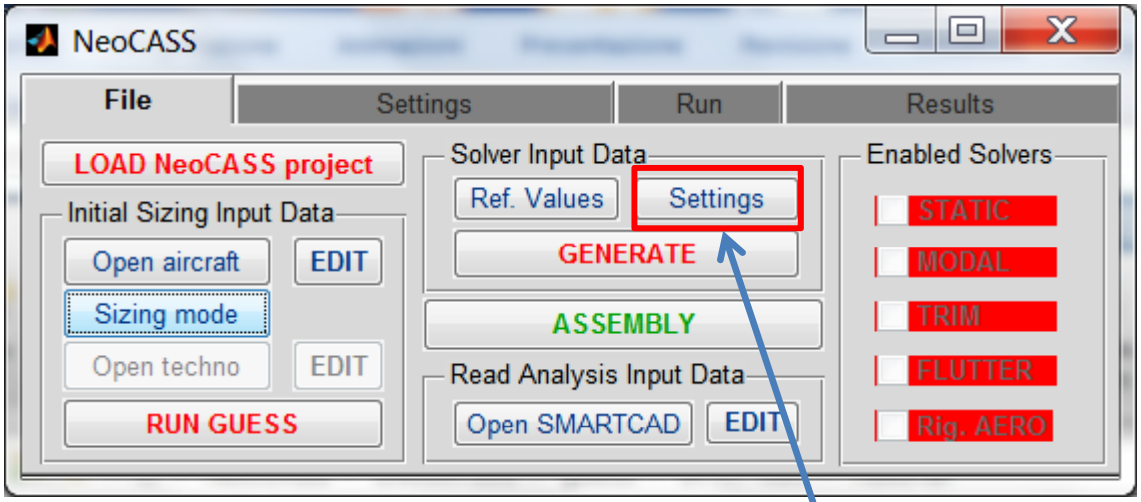


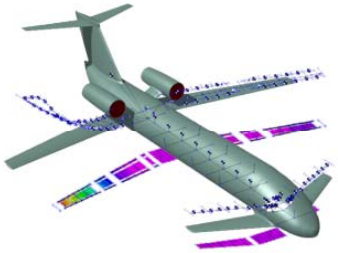
Only *Chord*, *Span* and *Surface* have to be defined. The other quantities assume the default values.



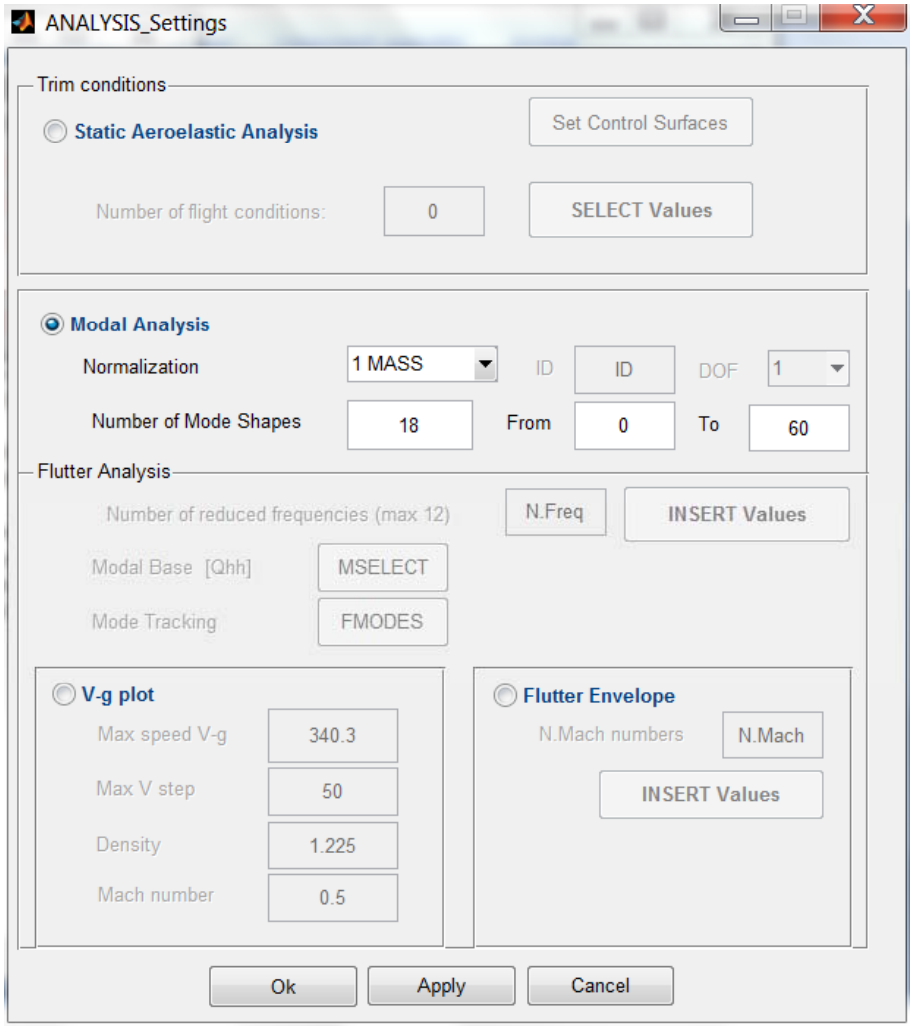
Definition of the Analysis problem



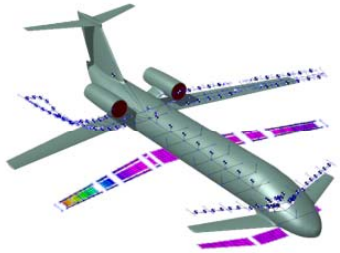
Press the *Settings* button to start the definition of the analysis problem.



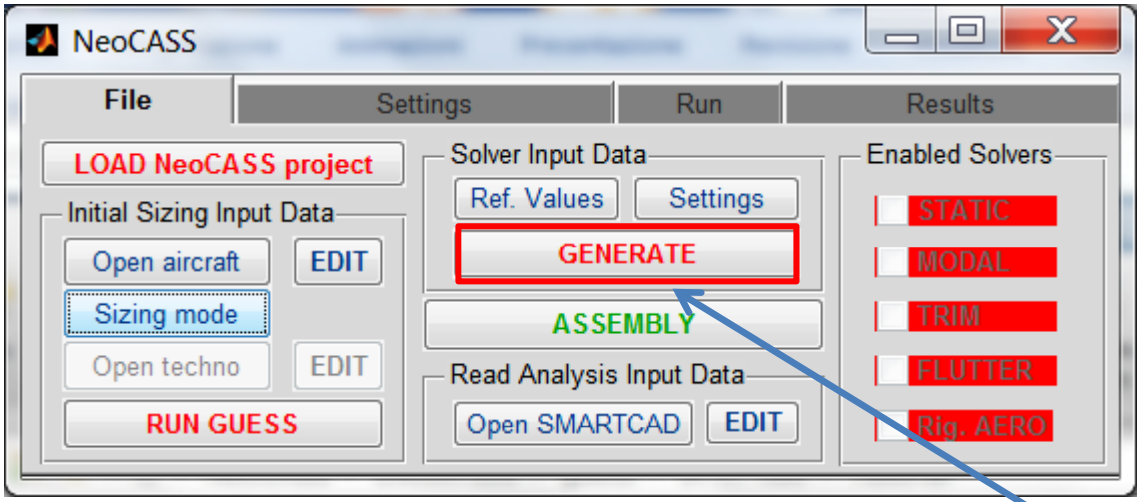
ANALYSIS Settings definition: MODAL ANALYSIS



This panel allows the user to define the analysis problem to be solved.
To run the Flutter analysis at first a MODAL analysis has to be performed.

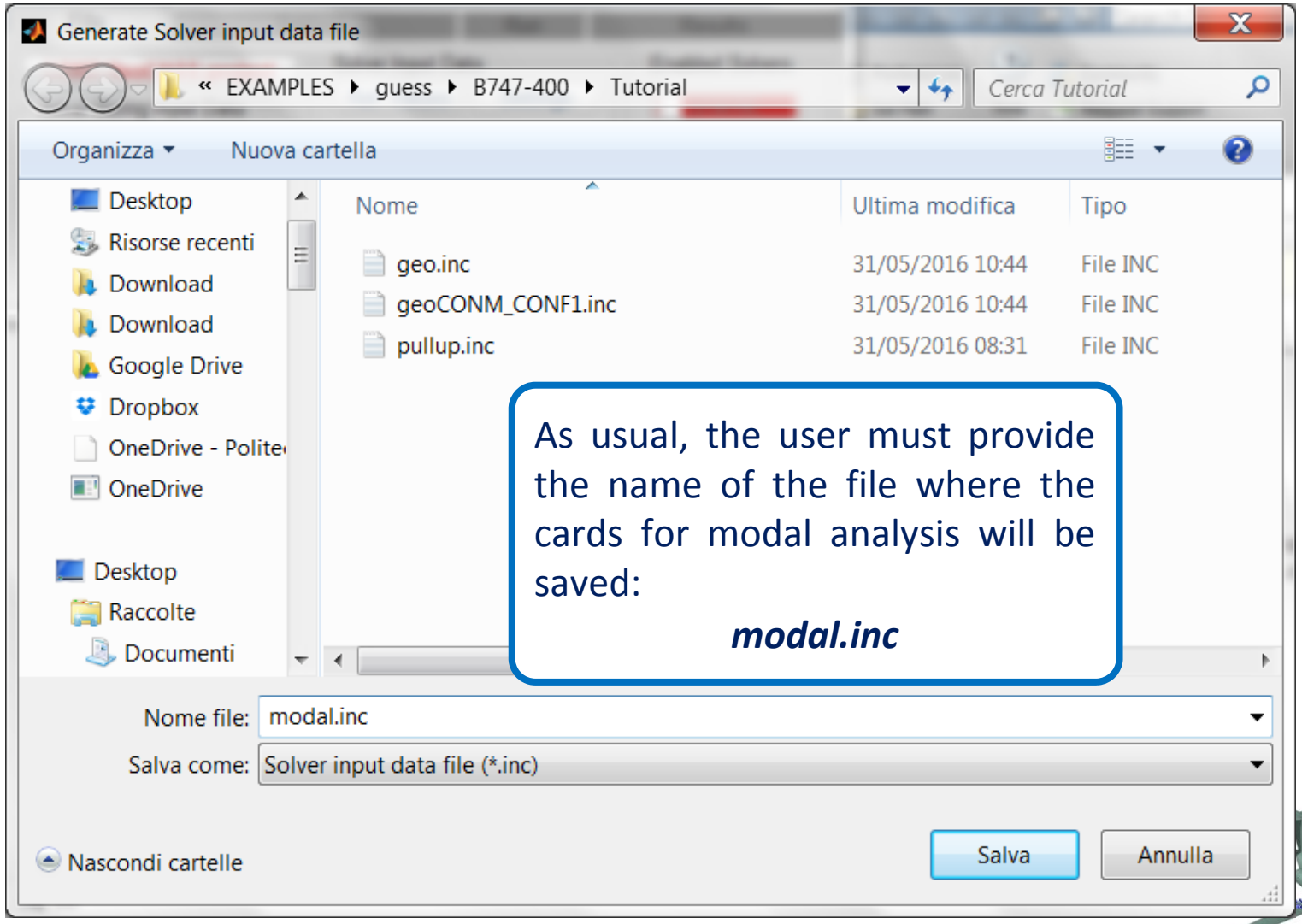


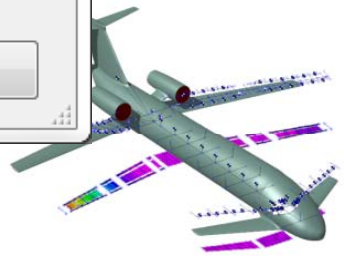
Definition of the MODAL analysis problem



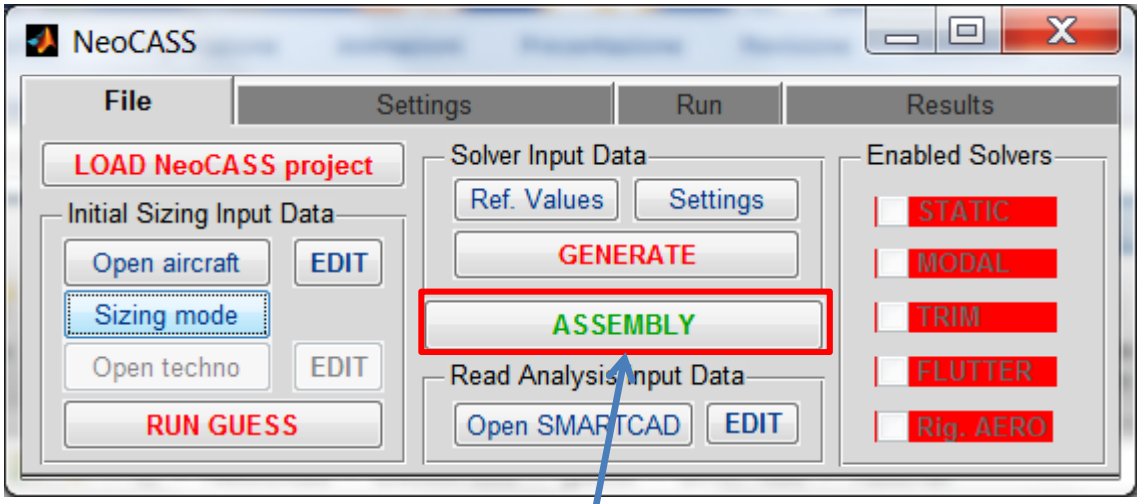
Press the *GENERATE* button to save the input data for modal analysis.

ANALYSIS Settings definition: MODAL ANALYSIS

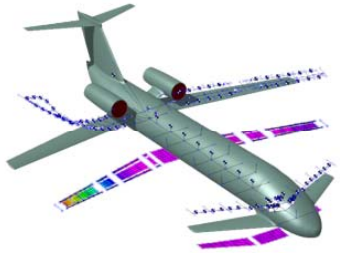




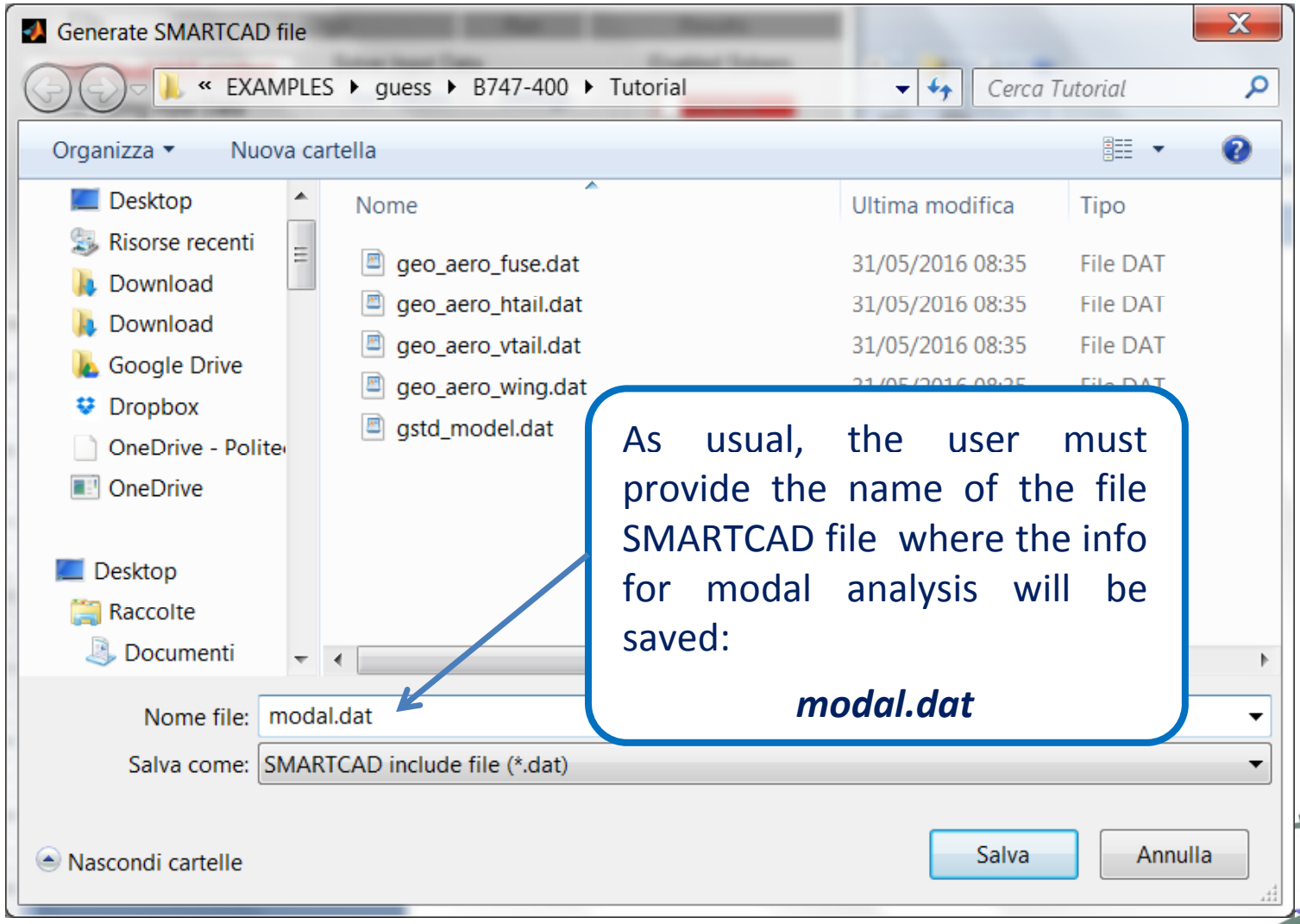
Generation of SMARTCAD input file for MODAL analysis



By pressing the *ASSEMBLY* button it is possible to **merge** the different files (.inc) already prepared **into an unique SMARTCAD analysis file** (.dat)

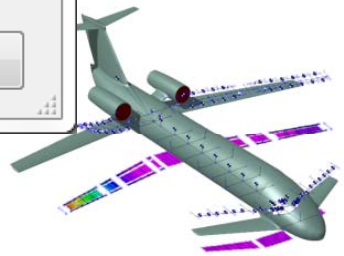


Generation of SMARTCAD input file for MODAL analysis

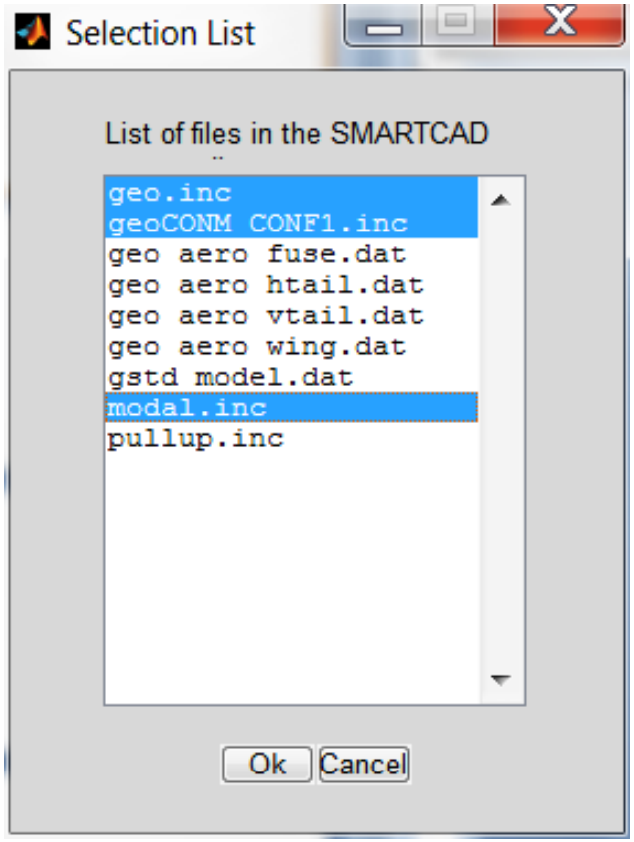


As usual, the user must provide the name of the file SMARTCAD file where the info for modal analysis will be saved:

modal.dat



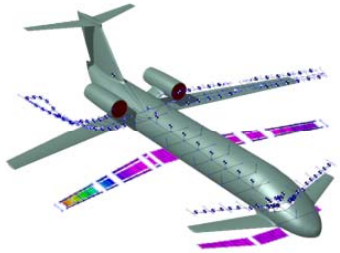
Generation of SMARTCAD input file for MODAL analysis



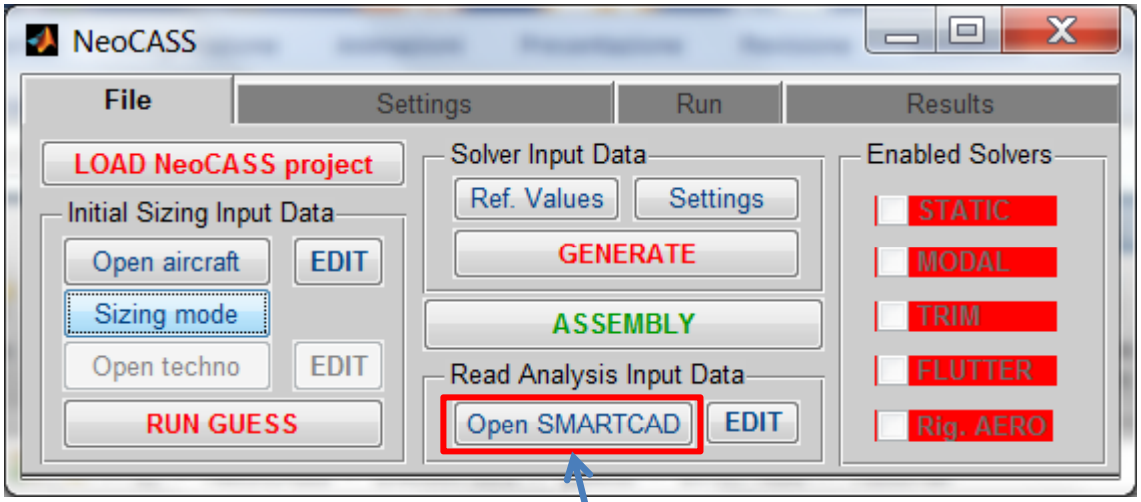
To define a SMARTCAD file usually it is necessary to include:

- The **mesh** model created by GUESS
- The **MASS** file including the non structural masses
- The **analysis file** including the cards requested for a specific analysis

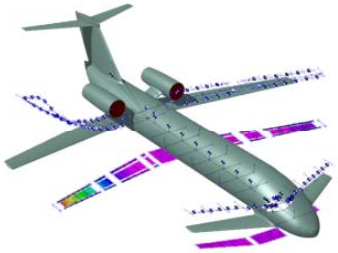
The Popup window shows all the files available in the current folder and the selection can be done in an usual Windows style using the left mouse button + SHIFT or CTRL button.



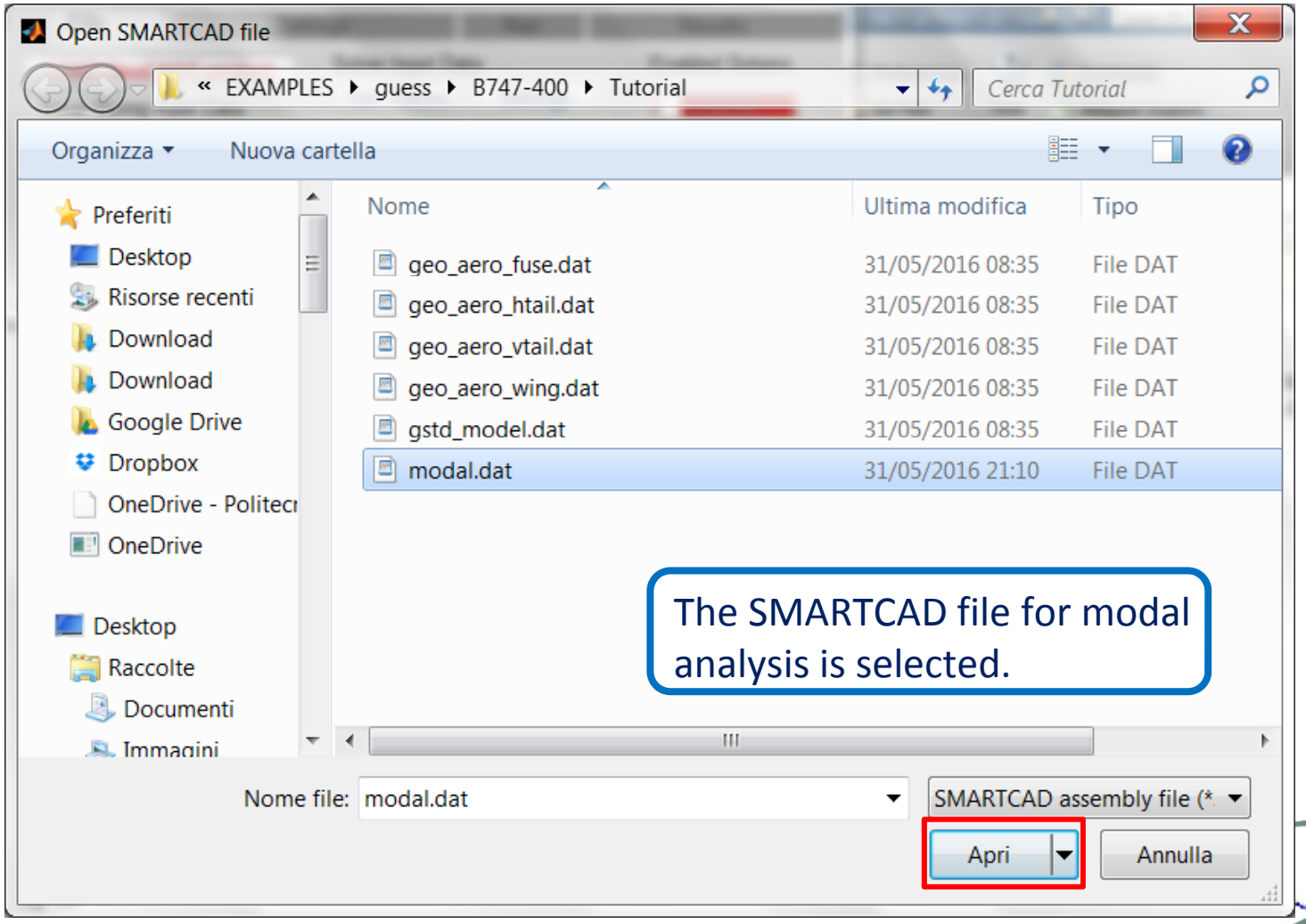
Running SMARTCAD



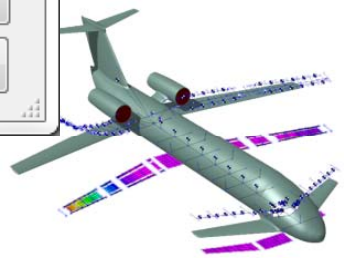
To run a SMARTCAD analysis it is necessary to open the corresponding analysis file (*modal.dat*)



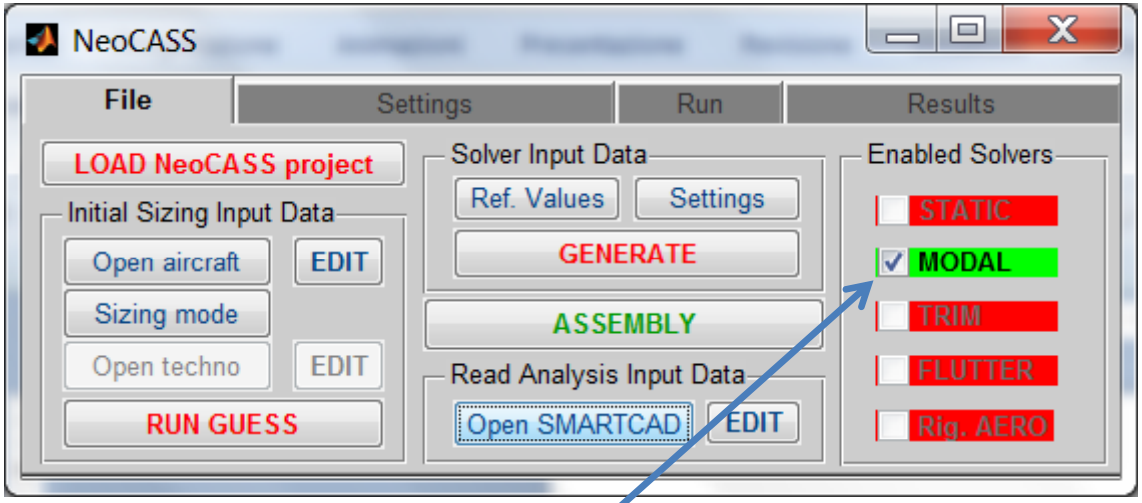
Running SMARTCAD



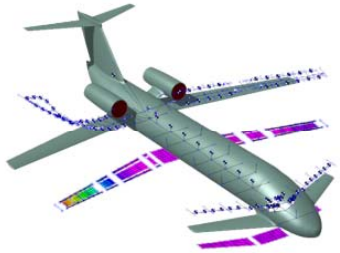
The SMARTCAD file for modal analysis is selected.



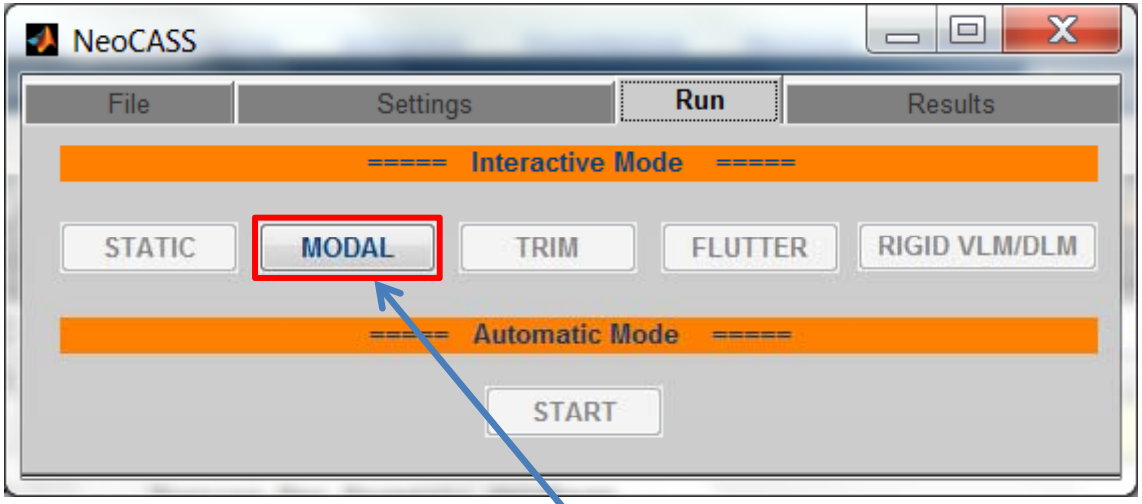
Running SMARTCAD



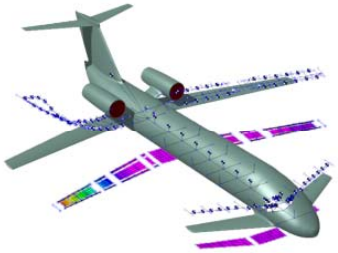
NeoCASS processes the provided SMARTCAD file and on the basis of the included cards shows which kind of analysis can be carried out (green message).
In the case of modal file, only modal analysis can be performed.



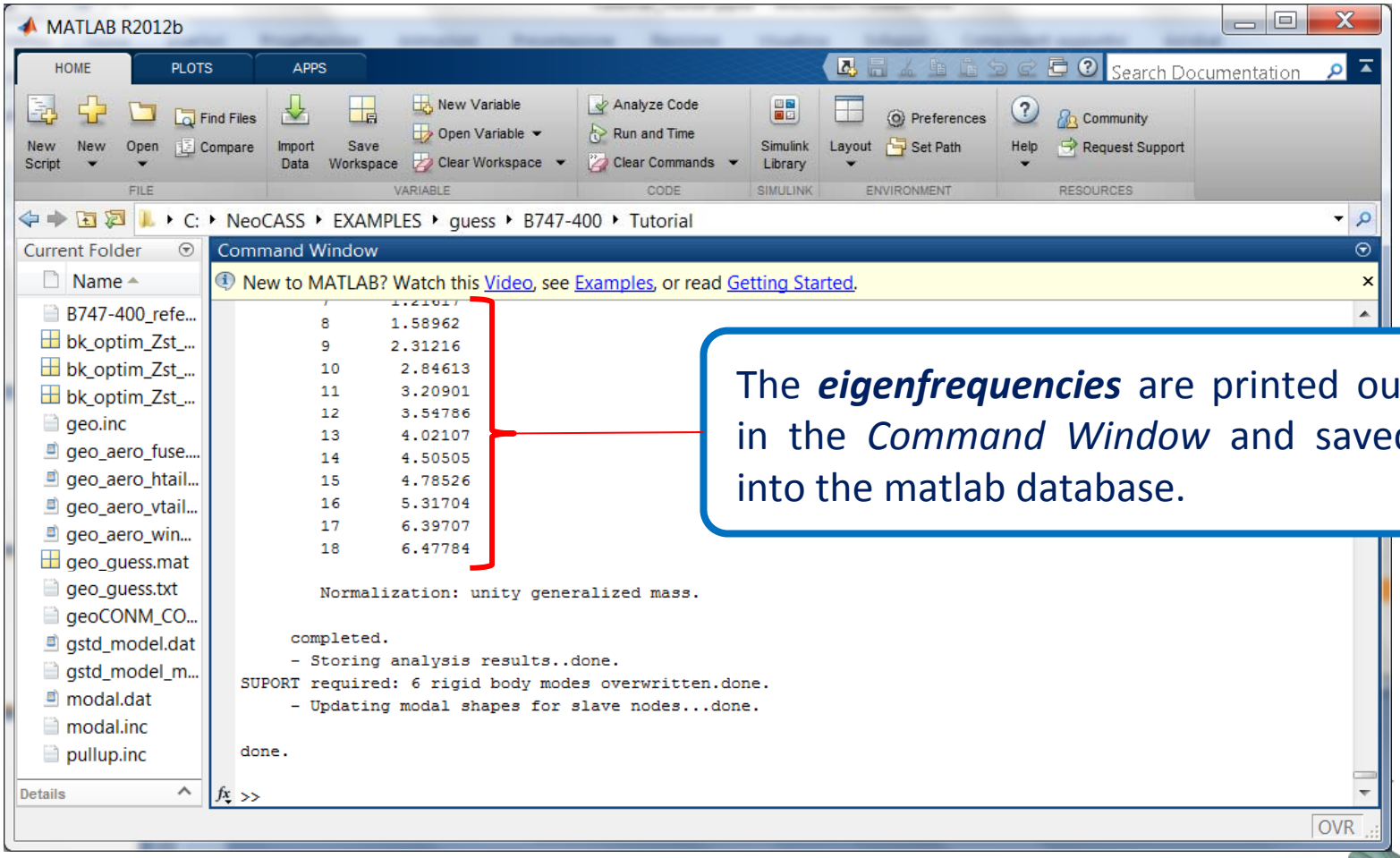
Running SMARTCAD



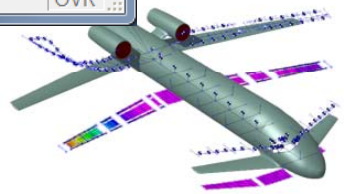
Pressing the RUN Tab, it is possible to see that only the MODAL analysis button is now active. Press the button to run the analysis



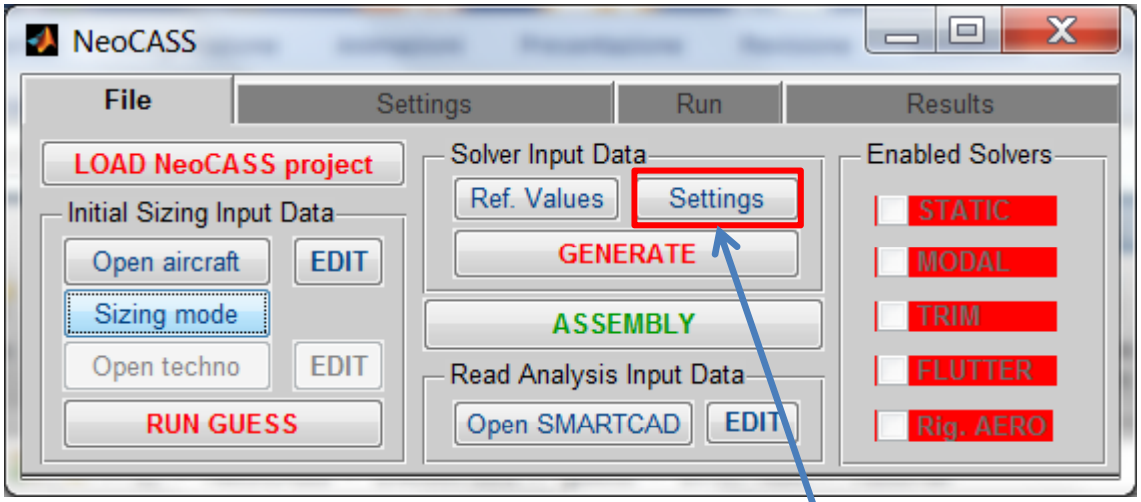
Running SMARTCAD



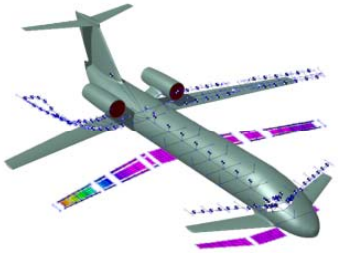
The ***eigenfrequencies*** are printed out in the *Command Window* and saved into the matlab database.



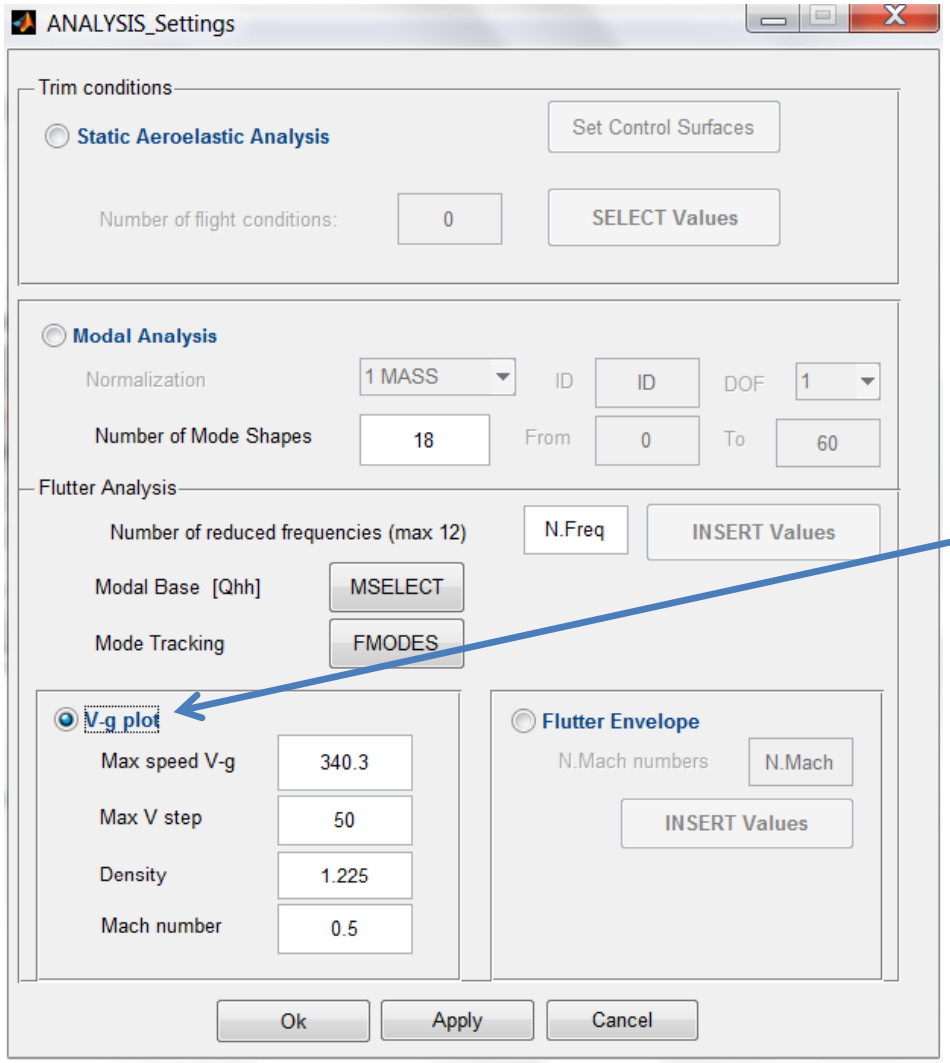
Definition of the FLUTTER problem



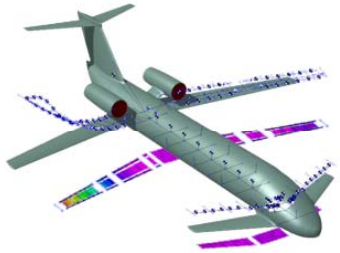
Press the *Settings* button to start the definition of the flutter problem.



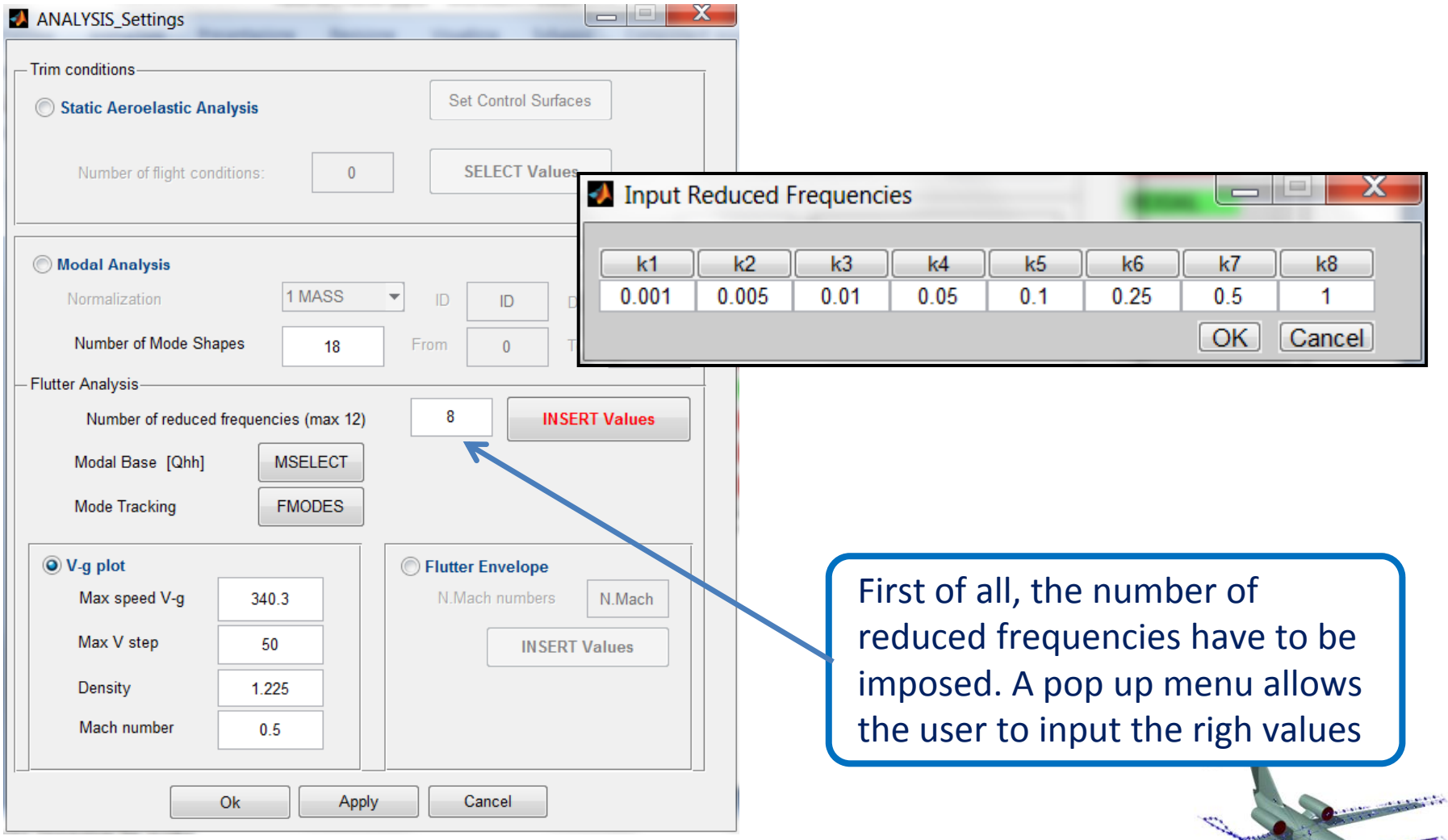
Definition of the flutter problem



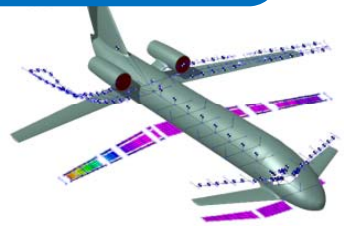
The standard ***V-g plot*** option is selected. The analysis parameters are usually correct for any kind of test case, otherwise have to be updated



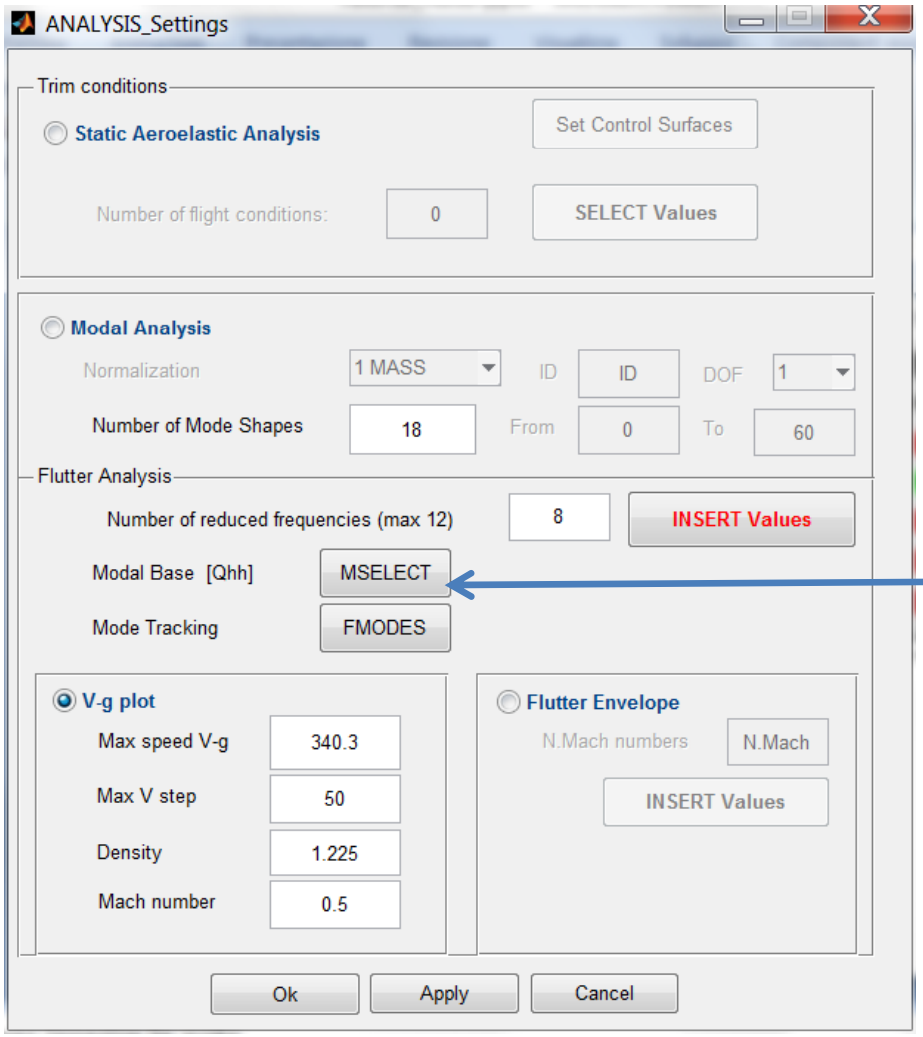
Definition of the flutter problem



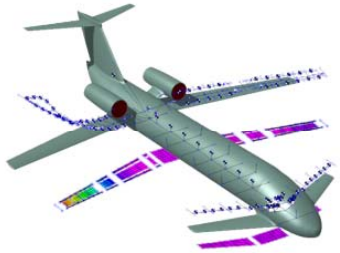
First of all, the number of reduced frequencies have to be imposed. A pop up menu allows the user to input the righ values



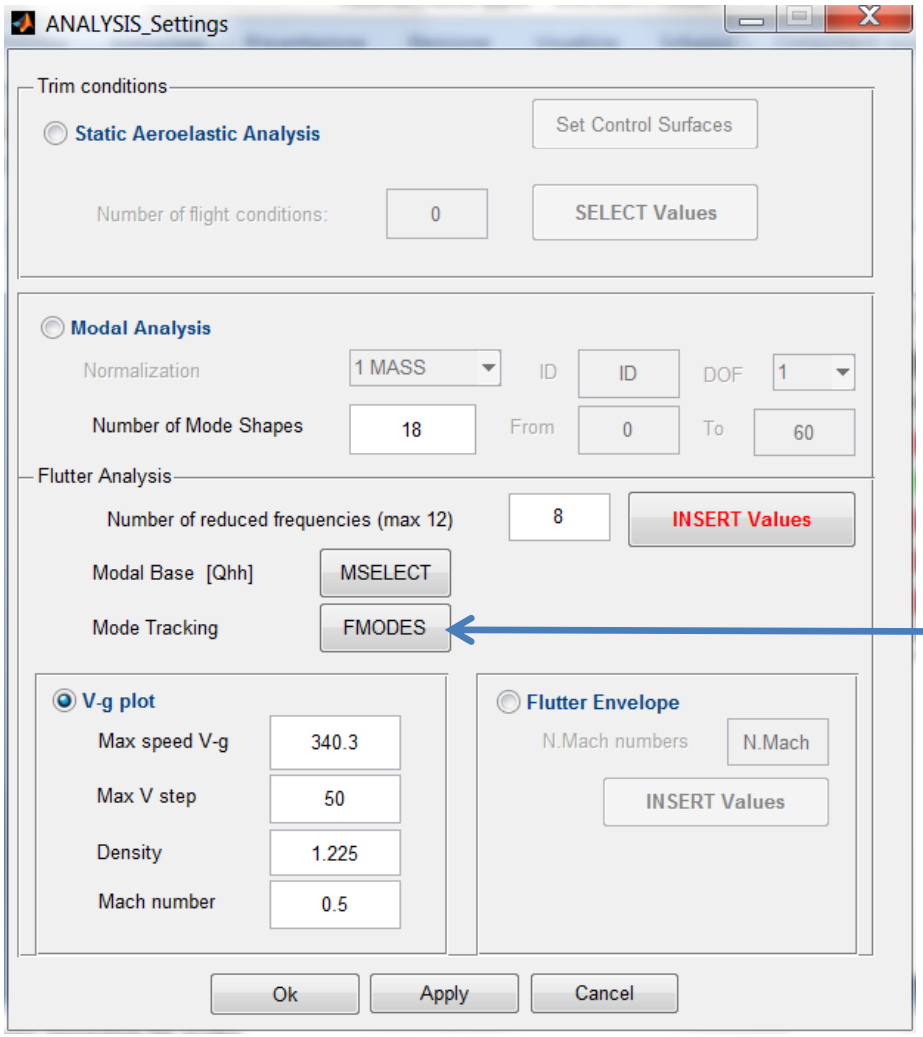
Definition of the flutter problem



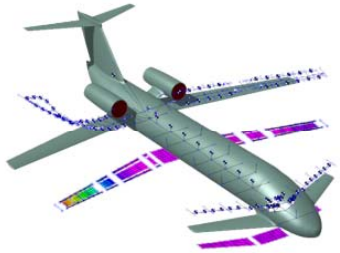
MSELECT Button is used to select the the modes that have to be included into the aeroelastic system.



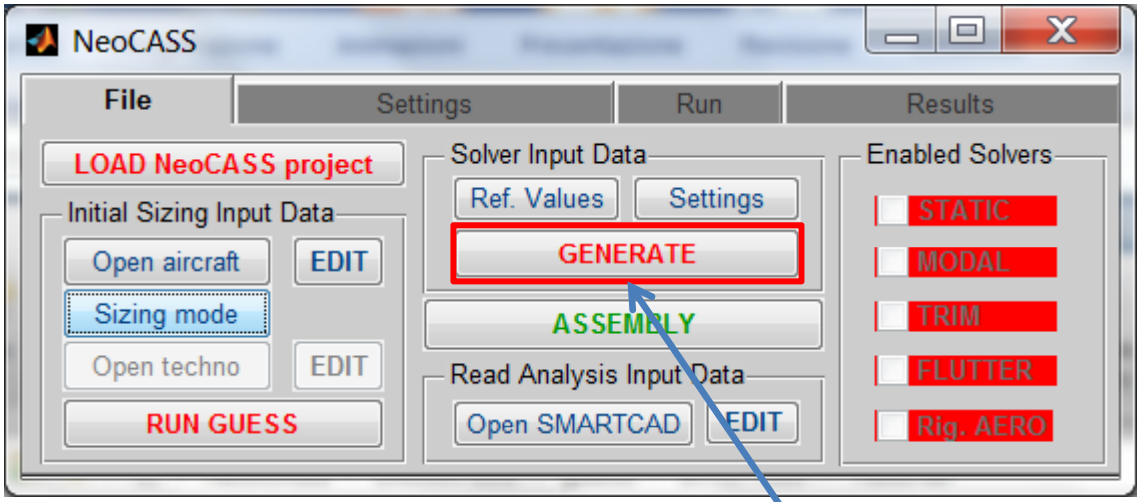
Definition of the flutter problem



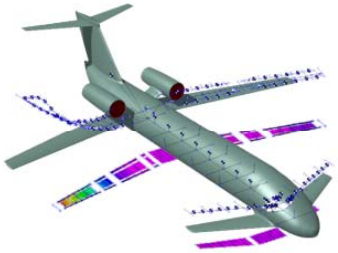
FMODES Button is used to select the modes that must be tracked in the V-g plot.
IMPORTANT: the rigid modes cannot be included!



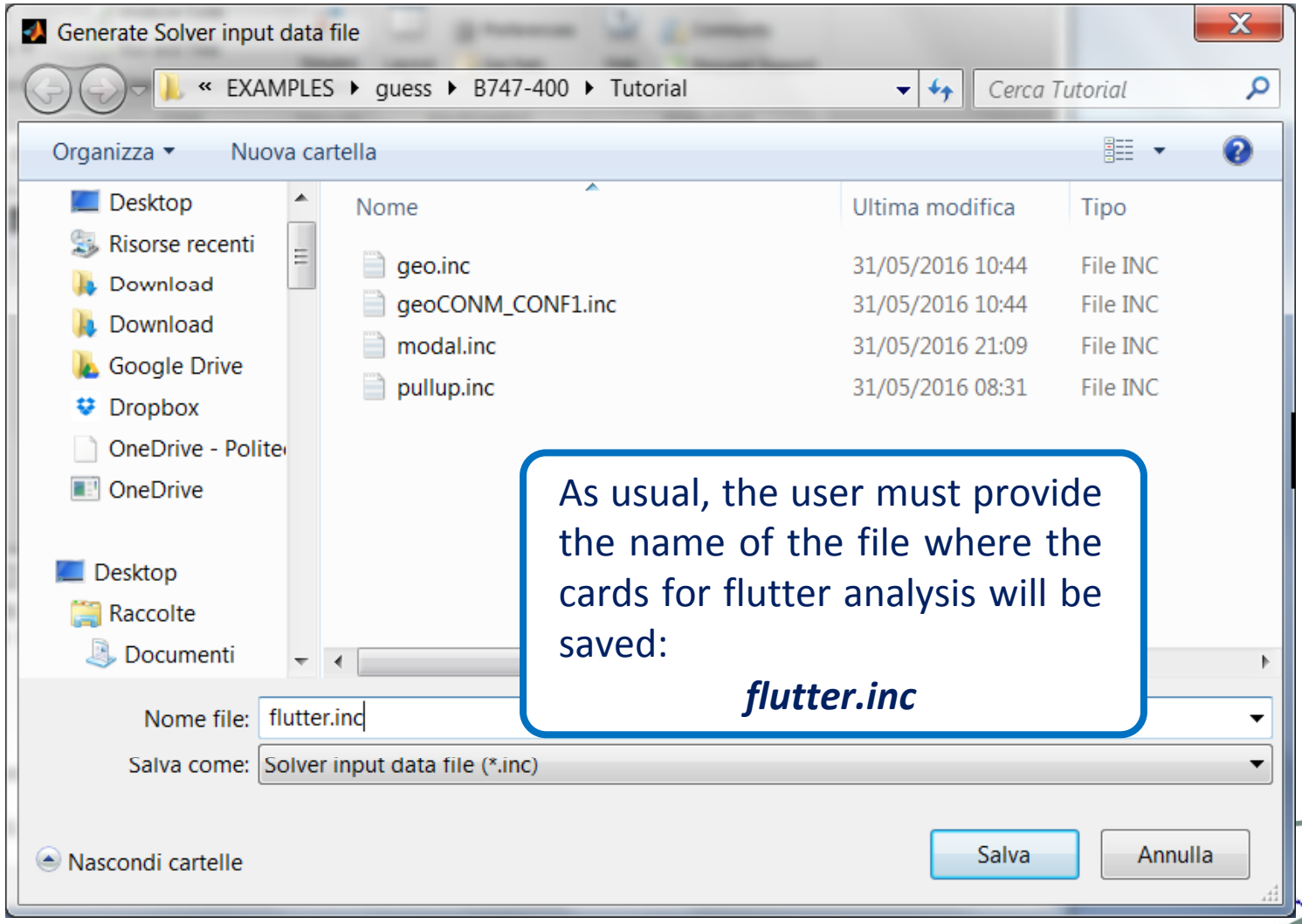
Generation of the input file for flutter problem



Press the GENERATE button to save the input data for flutter analysis.

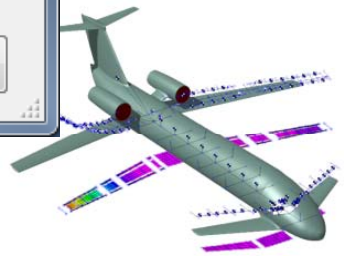


Generation of the input file for flutter problem

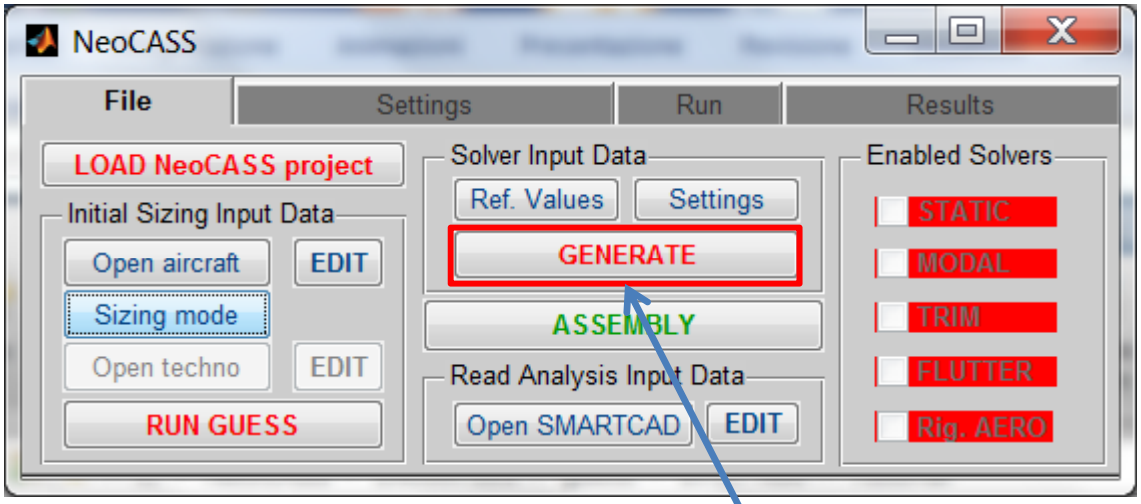


As usual, the user must provide the name of the file where the cards for flutter analysis will be saved:

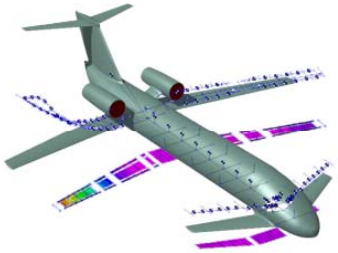
flutter.inc



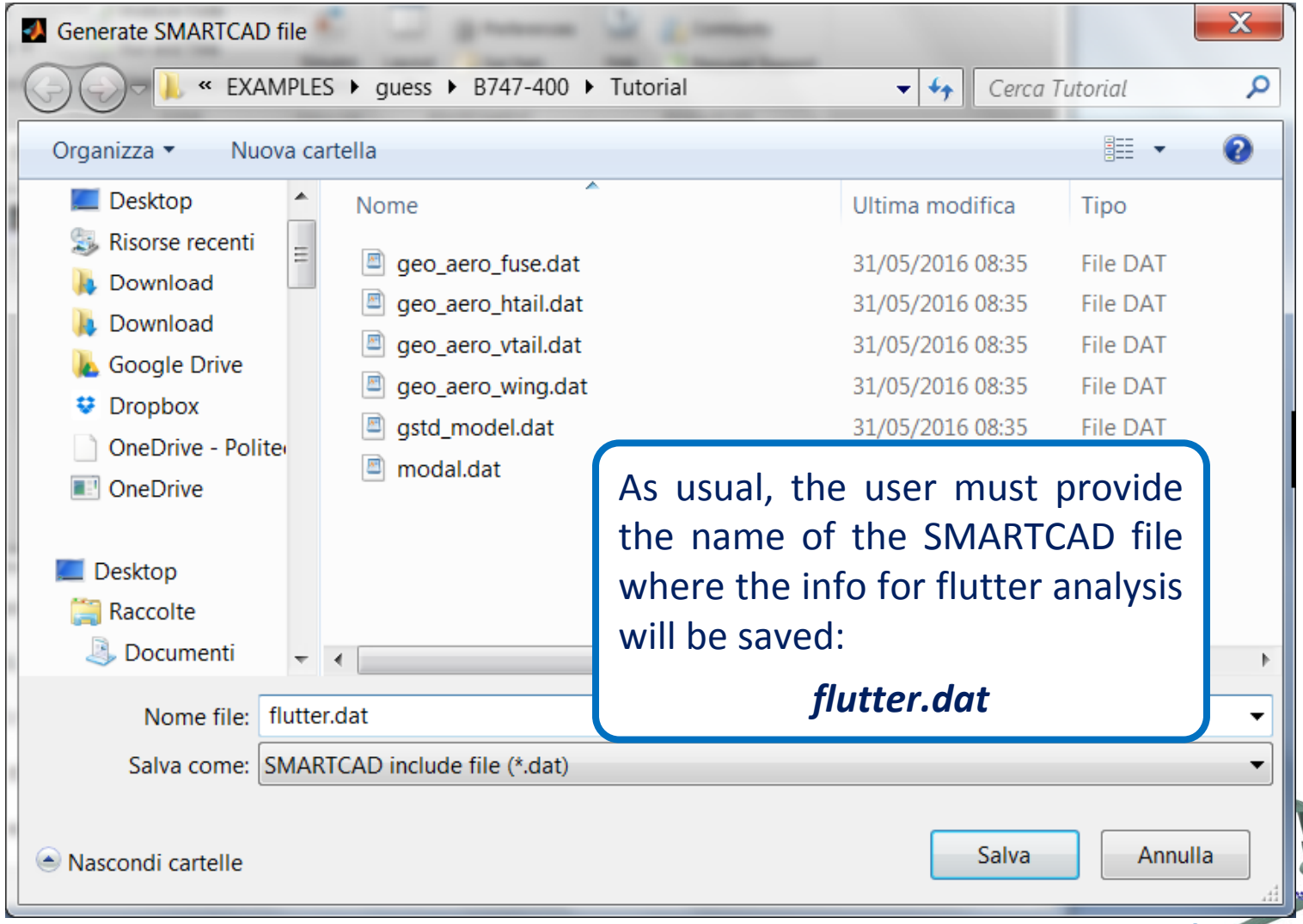
Generation of FLUTTER analysis SMARTCAD file



By pressing the *ASSEMBLY* button it is possible to merge the different files (.inc) already prepared into an unique SMARTCAD analysis file (.dat)

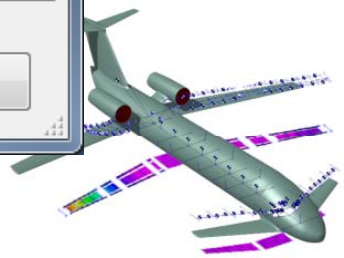


Generation of FLUTTER analysis SMARTCAD file

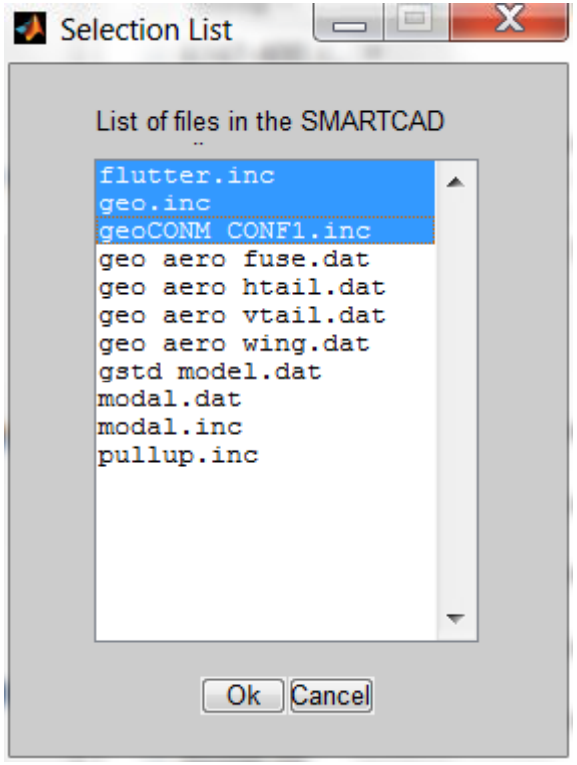


As usual, the user must provide the name of the SMARTCAD file where the info for flutter analysis will be saved:

flutter.dat



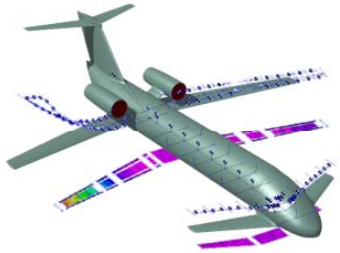
Generation of FLUTTER analysis SMARTCAD file



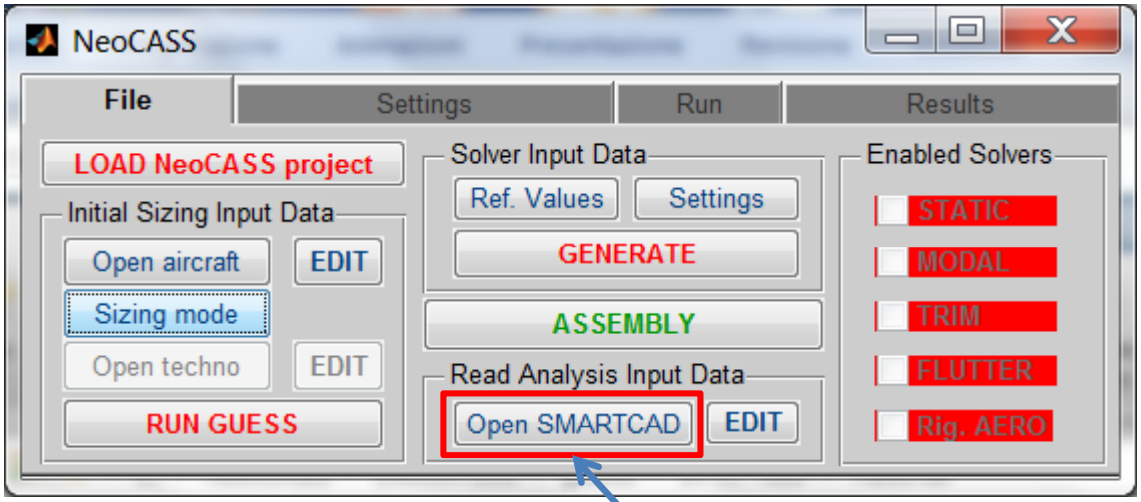
To define a SMARTCAD file usually it is necessary to include:

- The **mesh** model created by GUESS
- The **MASS** file including the non structural masses
- The **analysis file** including the cards requested for a specific analysis

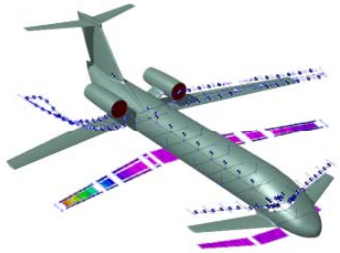
The Popup window shows all the files available in the current folder and the selection can be done in an usual Windows style using the left mouse button + SHIFT or CTRL button.



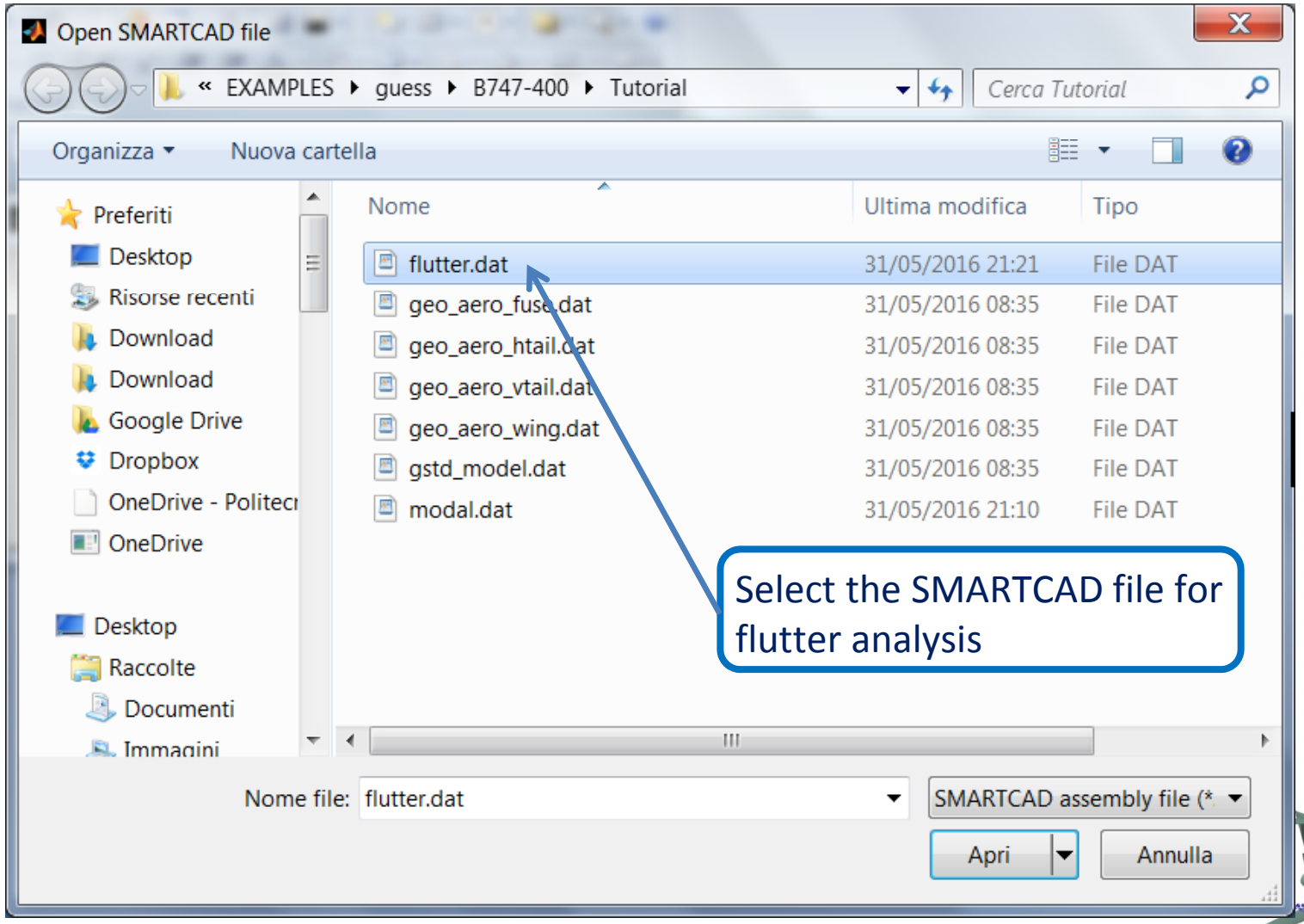
Running flutter in SMARTCAD



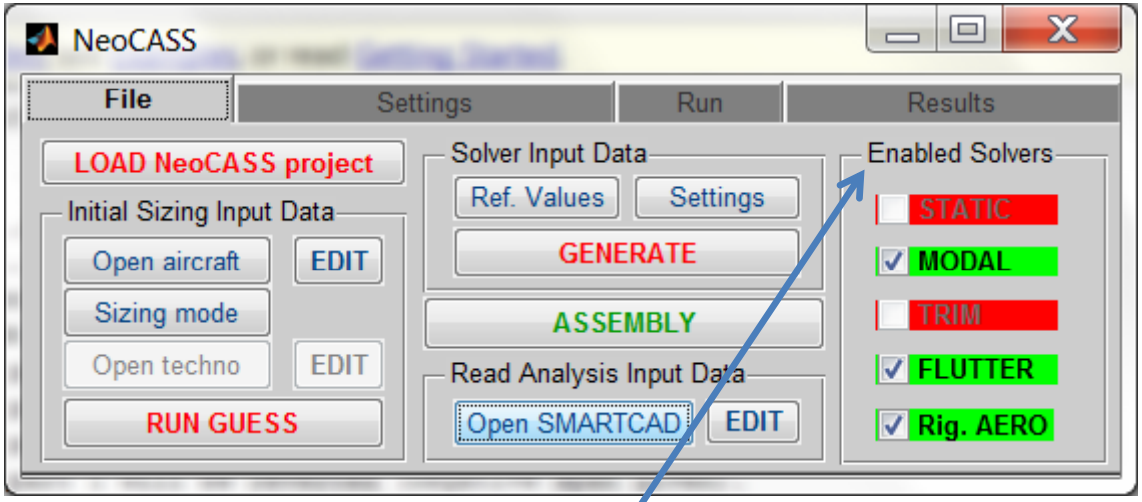
To run a SMARTCAD analysis it is necessary to open the corresponding analysis file (.dat)



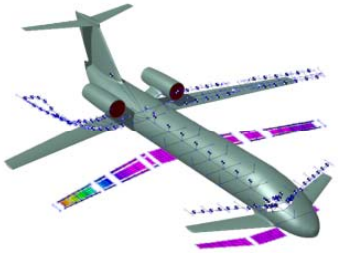
Running flutter in SMARTCAD



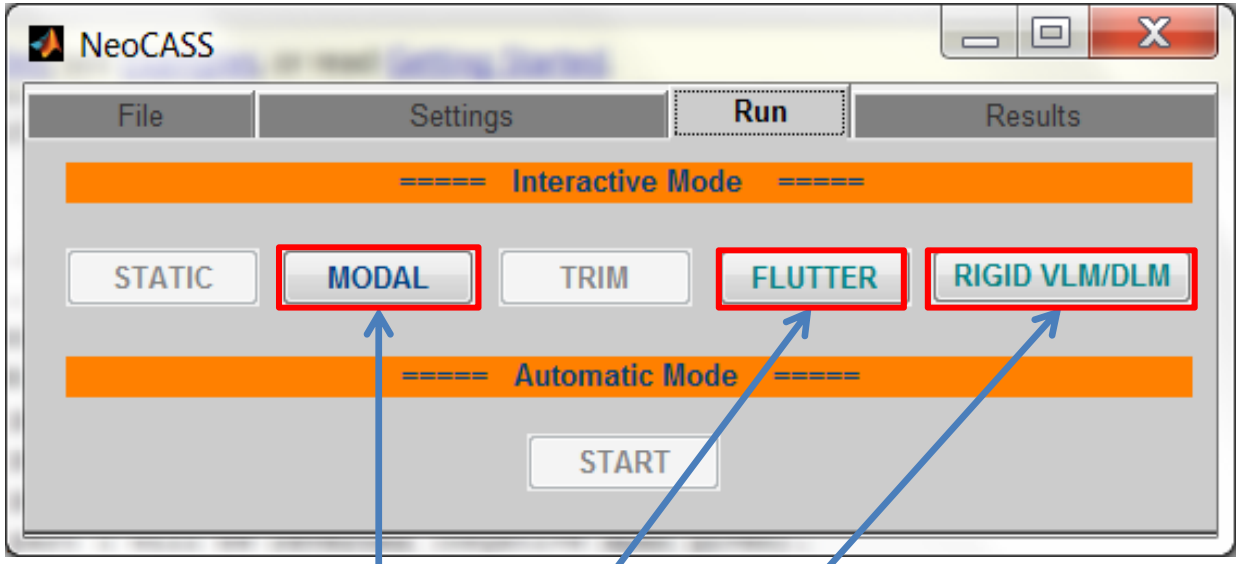
Running flutter in SMARTCAD



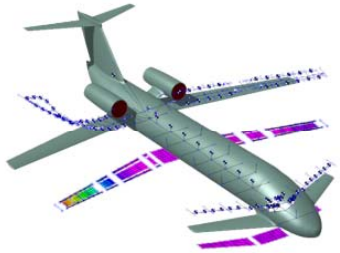
NeoCASS processes the provided SMARTCAD file and on the basis of the included cards shows what kind of analysis can be carried out (green messages). In the case of flutter different analyses can be executed with the same cards.



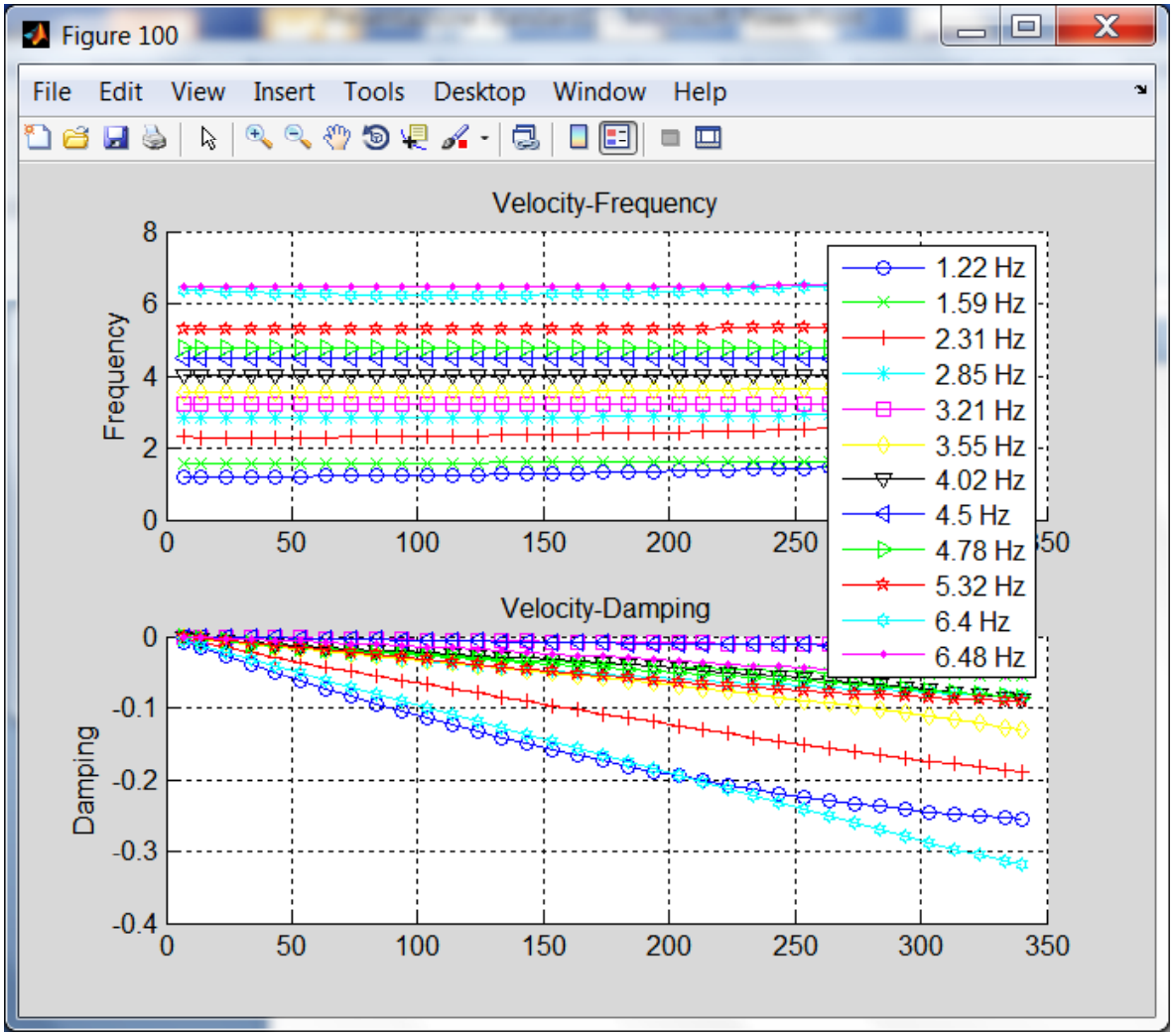
Running flutter in SMARTCAD



Pressing the *RUN* tab, it is possible to see that three run buttons are now active. Press the *FLUTTER* button to run the flutter analysis.



Running flutter in SMARTCAD



After the due time, the final ***V-g plot*** appears on the screen.

In the present case, *no flutter is found*