

MANE - 4500 Modeling and Control of Dynamical Systems

Active Flutter Control - Part #1

Student's name and RIN: #

I. Background Research

Here one would write about the highlevel aspects of wing flutter and include any literature review done on the subject which has helped the development of the proposed active flutter control system. This section should act as an introduction.

A. Mathematical model of the wing's aeroelastic behavior

Here, write the equations that would be used to model the flutter behavior of the wing, including assumptions and limitations of the chosen model. Do not forget to cite any sources used, e.g., [1].

If you have decided to use a Latex environment to write your report, equations can be written with a couple of different commands, e.g., simple equations (one liners) can be written as:

$$y = Ax + B \tag{1}$$

longer ones or perhaps a system of equations can be written as:

$$y_1 = 2x + 3, \tag{2}$$

$$y_2 = 5x + 1. \tag{3}$$

Similarly to sections, by adding an asterisk after the command name "equation*" one can remove the numbering. Also, notice that it is possible to label an equation and in the text refer to that equation using the label. This introduces the equation number, e.g., (1) is just a linear system of equations in vector form.

II. Proposed control system

A. Inputs, outputs

Use this to describe your choice of reference signal and consequently what the system's output will be. Motivate this choice.

B. Sensor

One may also want to tabulate their findings about types of sensor that can be used in this active control system with their advantages and disadvantages. For this one should use tables, as follows:

Sensor type	Operating principle	Advantages	Disadvantages

Table 1 Sensors - literature review

Note how the & are the symbols that mark different columns, that the command `\begin{table}[!h]` tells latex that the table should be placed as it is, and that if you want a horizontal line dividing the different table rows you must input the command `\hline` between each row.

C. Control law

Here you should elaborate on what type of control you imagine would be the best fit for this system, i.e., a PID, LQR, etc.

D. System schematics

Show a schematic (in block diagram form) of your control system. Label all signals and all blocks with their most specific names, i.e., if you have decided on a pitot tube as a sensor for angle of attack label the sensor as (pitot-static system/sensor). In Latex, figures are like tables in the sense that you must specify where you want them to show up in your document, the options are:

- `\begin{figure}[!h]` which is "where they are coded";
- `\begin{figure}[tp]` which is "top of page";
- `\begin{figure}[bp]` which is "bottom of page";

This can be a pain, like in word and one must exercise patience when placing figures in documents. Personal tip, you may have to move text around to place a figure exactly where you want. See the full syntax in the compiled code.



Fig. 1 Just a meme

One final note about the references, it will only auto-generate the references that have been directly cited in your document. See line 40 of the compiled code `\cite{raymer2012aircraft}`.

Also try[2] here

References

- [1] Raymer, D., *Aircraft design: a conceptual approach*, American Institute of Aeronautics and Astronautics, Inc., 2012.
- [2] Mönning, J., "How to Cite a Website with BibTeX," 2016. URL <https://jonas-moennig.de/how-to-cite-a-website-with-bibtex/>.