Dynamics and Control of Flexible Aircraft (DCFA)

2019-2020 edition

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Preferred interaction method (questions, discussions, document exchange): **Beep's Blog & Forum**

Preferred direct contact method: email *(write "DCFA" in the subject!)*

Blog:
- Announcements, links to additional material

Forum:
- Discussion on lectures, exercises and laboratories
- Errors in the teaching material

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Class organization:

- Tuesdays: lesson – B8.07 (316 seats)
- Wednesdays: lesson – L.01 (270 seats)
- Thursdays: lesson – B8.12 (316 seats)
- Fridays: exercises – L.09 (152 seats) / BL27.14 (103 seats)

The Friday exercises are in 2 teams, based on family name initial:

- **A-K: L.09** (152 seats)
- **N-Z: BL27.14** (103 seats)

<u>Seating might be critical during Fridays; please respect the partitioning</u>

Dynamics and Control of Flexible Aircraft (DCFA)

Telematic class organization:

- You have received instructions, correct? ;-) <u>We will use MS Teams</u>
- <u>Lectures will be recorded</u> (please remind me, in case)
- We all need to practice and learn; *please be patient, and bear with me*
- Chat:
  - I might <u>not be able to answer</u> (or even read) questions online
  - As a general rule, <u>I will not interrupt the flow to answer the chat</u>
  - Every now and then, <u>I will stop and ask for questions</u>
  - I'll dedicate a small amount of time to <u>answer questions online</u>
  - I'll read all questions and try to <u>answer them later using Beep's Forum</u>
- Beep:
  - Documents shared on my desktop will be <u>loaded on Beep in advance</u>
  - During *exercises*, <u>Beep's Forum will be attended all time</u>

Dynamics and Control of Flexible Aircraft (DCFA)

[NOTE: only in case we revert to physical classrooms]

Schedule:

- There will be a **break** from April 25th to May 4st (with “lauree” on April 29th, and only April 28-30th in between, so we will cancel those lectures); there will be (optional) **home assignments**

- There will be another **break** from May 16th to May 25th (because I am attending a conference); there will be further **home assignments**

- **Updates** of the schedule (due to unforeseen events) will be communicated using **Beep**

Dynamics and Control of Flexible Aircraft (DCFA)

Teaching material:

- Several recommended documents (papers, books, reports)
- DCFA (dcfa.pdf)
- Other documents (e.g. exercises) passed during the classes

DCFA might be (a)periodically updated as the course progresses
(error fixes, clarifications, additional exercises)

Exercises for self-assessment will be notified on Beep,
either referring to DCFA or as separate documents

There might be (optional) home assignments

Reference to books, journal papers, reports will be made.
As a general rule, reading from multiple sources and comparing them is a good way to learn and challenge one's understanding of a topic

Dynamics and Control of Flexible Aircraft (DCFA)

Exam:

- The exam consists of <u>a written test</u>, followed by <u>a colloquium</u>
- The written test takes 3 hours
- It usually consists of 3 (relatively open) questions
- Examples from several past years are available on Beep
- Immediately after the test there might be a brief explanation (time permitting)
- The colloquium will start with the correction of the written test
  - <u>No correction will be made in advance</u>
- There will be a little bit of freedom in choosing the colloquium date

Rules of conduit:

- Students must register to be admitted to the test; **no late registration!**
- No special dates! <u>Tests will only take place in official dates</u>
  - *Please, do not even ask for extraordinary tests in unofficial dates*

Dynamics and Control of Flexible Aircraft (DCFA)

2017-2018 throughput:

In 2017-2018, **354** students enrolled in this class: **232** for the first time, in 2017; 74 in 2016; 26 in 2015; 13 in 2014; 7 in 2013; 2 in 2012.

Of them, **147 (41.53%)** passed the exam, with an **average mark of 24.35** (21 with either 30 or 30 cum laude, 14.29% of those who passed the exam; the distribution of marks is relatively uniform).

It is worth noticing that **only a fraction of the enrolled students actually tried the test**. In fact, out of 354 students, **only 217 (61%) registered for at least one test**; **only 173 (49%) actually showed up at at least one test**. This means that the ratio of passing the exam with respect to at least registering is 67.74%, and **the ratio of passing the exam with respect to showing up is 84.97%**!

The (obvious) conclusion is that **if you don't show up, you won't pass the exam**. Those who showed up had 85% chances of passing (of course it depends on how well they prepared the exam).

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2018-2019 throughput:

In 2018-2019, **454** students enrolled in this class: **280** for the first time, in 2018; 121 in 2017; 33 in 2016; 9 in 2015; 6 in 2014; 4 in 2013; 1 in 2012.

Of them, **160 (35.24%)** passed the exam, with an **average mark of 24.14** (19 with either 30 or 30 cum laude, 11.88% of those who passed the exam; the distribution of marks is relatively uniform).

It is worth noticing that **only a fraction of the enrolled students actually tried the test**. In fact, out of 454 students, **only 284 (63%) registered for at least one test**; **only 236 (52%) actually showed up at at least one test**. This means that the ratio of passing the exam with respect to at least registering is 56.34%, and **the ratio of passing the exam with respect to showing up is 67.80%**!

The (obvious) conclusion is that **if you don't show up, you won't pass the exam**. Those who showed up had nearly 70% chances of passing (of course it depends on how well they prepared the exam).

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A project will be proposed as a(n optional) home assignment during the two breaks: develop an aeroelastic model of:

- a swept wing
- a foldable wing tip

(The two problems can be merged)

The bottomline will be:

- a detailed structural dynamics, simplified aerodynamics model
- suitable for flutter investigation / optimization for loads alleviation

Details will be defined later

Dynamics and Control of Flexible Aircraft (DCFA)

Further additional activities:

1) WeirdoNamics Contest:

- Create your own dynamics exercise (see appendix C of DCFA)
- Make it as strange, complex, difficult (weird) as you like
- Make sure you can provide a solution

The *weirdest* wins

Format it in LaTeX following DCFA's style and we'll include it (with credits)

2) YouTest:

- Propose an (original) exercise you would like to see in the written test
- Make sure you are able to provide a correct solution
- The "best" one - with cosmetic adjustments - will be *in the June test!*

3) Tweet It!

- Summarize one of the course's concepts in a tweet (140 chars)
- Be substantially *complete*, but formally *synthetic*!