Project work part 2, due at 12:00 on February 25

The purpose of the project is to determine the unsteady aerodynamic derivative C_{lp}. The aircraft model is a schematic Draken configuration with a double delta wing planform. The experimental setup consists of the aircraft mounted on a flexible sting with a known torsional stiffness.

The experimental work is performed in groups (see bilda). Your results should be presented in a new section of your project report which you started to work on in the previous project on performance analysis.

Before the wind tunnel lab

Before the lab, read the relevant pages in the book about p derivatives, for example p. 149-152. You should derive suitable equations of motion for the test setup using the general equations of motion as a guide. You should be able to model the dynamics of the test set up using a system of ordinary differential equations with two state variables. You will need to add one additional term to model the elastic force of the flexible sting.

You should also investigate different numerical methods for estimating a complex eigenvalue from time domain measurement data. You could try to fit your data to a given model or use some form of system identification techniques such as `n4sid` in Matlab. There is sample experimental data available on bilda which you can use to investigate different methods.

```
>> load vibdata
>> plot(t0,x0)
>> plot(t20,x20)
>>
```

During the wind tunnel lab

Each group can choose several speeds to perform the test at. You may also use different angles of attack. If you vary the angle of attack, you may also attempt to determine the aerodynamic derivative $C_{l\beta}$, see page 81-83 of the text book.

After the lab

Process the measured roll rate as a function of time for the different tests. You should try to identify an eigenvalue in the form of a complex number, which you can compare to the computed estimate obtained using your simulation model.