Robust nonlinear attitude control of aerospace vehicles

An incremental nonlinear control approach

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1. The equation–based and acausal modeling features of MODELICA are useful to support preliminary studies in launch vehicle design. *(this thesis)*

2. For a class of input–affine nonlinear systems, incremental nonlinear dynamic inversion (INDI) is equivalent to a nonlinear PID control derived from model–based time delay control (TDC). (*this thesis*)

3. Control effectiveness uncertainty can be rejected by INDI, TDC, and linear PID control. INDI has better robustness than TDC and linear PID control because of the proper model–based scheduling of this term. (*this thesis*)

4. Incremental nonlinear control is both model– and sensor–based. (*this thesis*)

5. Roboticists and aerospace engineers should collaborate and work more together. Each field can greatly benefit from findings and methods of the other.

6. Courses on *'how to interact effectively with your research partners'* or *'how to solve conflicts efficiently'* should be pursued by all involved parties.

7. "*Feynman's Algorithm" (1: Write down the problem. 2: Think real hard. 3: Write down the solution)* should have included "*1b: Understand the problem*". Feynman did not include this because he was a genius.

8. Risk–free investments (government backed treasury bonds, savings accounts, etc.) are not risk–free, and certainly not investments.

9. When honesty comes above politeness, it should not be implied to be impolite in order to be honest, or by being polite one is being dishonest.

10. When the ups and downs of a doctoral research resembles the ones in financial markets, a good strategy is to invest in the long term.

These propositions are considered opposable and defendable and as such have been approved by the promotor prof.dr.ir. Max Mulder.