Propositions accompanying the thesis

Identification for Advanced Motion Control: Numerically Reliable Algorithms for Complex Systems

1. Software developed during academic research is mainly aimed at generating simple didactic examples for scholarly articles. When confronted with the complexity encountered in the real world, such software often underperforms due to a lack of numerical reliability and robustness (see, e.g., [1]). These numerical aspects should be explicitly taken into account when aiming to develop software that performs well in practice (this thesis).
2. The state of a motion system depends on past inputs. By explicitly taking this memory effect into account, identification can be performed with reduced experiment times and improved accuracy (local parametric approach, this thesis chapter 2).
3. The current weather is a good indicator for the weather in an hour and an even better indicator for the weather in ten minutes. Due to this same mechanism, the delay operator and Z-domain are inadequate for the numerically reliable control and identification of fast-sampled physical systems and a delta-domain approach should be used instead (this thesis chapter 4).
4. Inferential motion control research has mostly focused on the mismatch between measured signals and performance variables ($z \neq y$), i.e., the right side of the standard plant (see Figure 1.3 of this thesis). As the essential role of feedback control is the suppression of uncertain disturbances, the left side of the standard plant is at least as important (this thesis chapter 5).
5. Models are essential for control, forecasting, simulation, monitoring, design, etc. Since models are by definition approximations of reality, well-trained engineers always accompany a model with a quality certificate.
6. Measures such as mandatory attendance and binding study recommendations positively affect institutional performance metrics without lowering course standards. Nevertheless, these measures should be used sparingly as they take away student agency and negatively impact the development of students towards independent professionals responsible for their own actions and performance.
7. Scientific progress requires creativity, to come up with innovative ideas, and productivity, to effectively validate, document, and communicate these ideas. As the latter of these is more readily quantifiable by objective metrics, a strong focus on such metrics to judge academic performance leads to an underappreciation of creativity.
8. Propositions 6 and 7 are good examples of the importance of recognizing the difference between measured variables and performance variables in all kinds of control problems.
9. As we specialize in a subject, we gradually unravel the many layers of complexity that were previously hidden by our ignorance. Extrapolating this to everything outside of our area of expertise leads us to conclude that it is a miracle that anything works at all.
10. The imbalance between the value of anecdote as a rhetorical tool and its value as a sound basis for policy is one of the main causes of the perceived gap between policy makers and the public.
11. If you want your defense to focus solely on the contents of your thesis, you should not include propositions.

[1] On numerically reliable frequency-domain system identification: new connections and a comparison of methods. Robbert Voorhoeve, Tom Oomen, Robbert van Herpen, and Maarten Steinbuch. In *Proceedings of the IFAC 19th Triennial World Congress*, 10018-10023, Cape Town, South Africa, 2014

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