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Parameter selection in multi-output systems

We present methods for a priori selection of parameters to be estimated in inverse problem formulations for models with multiple measurable outputs. Since in many modeling processes we have to deal with dynamical systems with numerous state variables and an even larger number of parameters, but with limited availability of data, we cannot expect to estimate all parameters with sufficient accuracy. Therefore methods of the type indicated above are becoming increasingly important. In situations with multiple measurable outputs we are also interested to know if the possibility to measure additional outputs would improve parameter estimates. Such questions become important if these additional measurements involve high costs, for instance. We illustrate the results for a model for insulin-glucose dynamics [2] and a model for the reaction of the cardiovascular system to an ergometric workload [1].

REFERENCES

- [1] F. Kappel and R. O. Peer, *A mathematical model for fundamental regulation processes in the cardiovascular system*, J. Math. Biology **31** (1993), 611 – 631.
- [2] M. Munir, *Generalized Sensitivity Functions in Physiological Modelling*, PhD-Thesis, University of Graz, April 2010.