Technische Universität München MUNICH AEROSPACE Universität der Bundeswehr München

# Kolloquium Satellitennavigation

## "Recursive BLUE-BLUP and the Kalman Filter: Estimation and Prediction Scenarios"

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The minimum-mean-squared-error (MMSE) property of the standard Kalman filter is often justified in the context of the best linear prediction (BLP). As a consequence, a-priori knowledge of the mean and variance matrix of the initial state-vector has to be postulated. This stringent assumption yields two not-well-addressed problems. First, in many, if not most, engineering disciplines, one aims at predicting a time-series of random parameters where their initial state is fully unspecified. In this respect, the standard Kalman filter with known mean cannot properly address the problem. The filter would then be usually initialized via a user-defined initial state-vector with a variance matrix taking sufficiently large values. This leads to the second problem: the estimation of the unknown means of the state-vectors remains unresolved, a situation which sometimes causes the prediction scenario to be misled by its estimation counterpart.

In this presentation, the problem of estimation and prediction in linear models will be briefly reviewed which is followed by the general estimation-prediction measurement-update equations for a time-series of observables. The theoretical shortcomings of the standard Kalman filter, mentioned above, will then be addressed through the BLUE-BLUP recursion in which it is shown how the new filter is indeed independent of the mean and variance matrix of the initial state-vector.

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| Ort: | **Technische Universität München**,<br>**Raum N 1090 (Stammgelände) im Gebäude N1** |
| Co-Organisation: | Christoph Günther, Urs Hugentobler, Bernd Eissfeller,<br>Roland Pail, Thomas Wunderlich, Patrick Henkel |
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