

博士課程教育リーディングプログラム 2019 年度リーディング特別セミナー

## Adaptive Buildings – A interdisciplinary research field between civil engineering and systems engineering

聴講  
自由

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### Abstract:

The building sector consumes currently more than 40 % of global resources and energy. Projecting the demand of buildings according to the increasing world population lead to significant resource problems in the near future. Therefore, increasing efficiency and reducing resources in the building sector is a crucial task. Adaptivity of the load bearing structures as well as the façade elements offers a high potential to reduce grey energy due to ultra light-weight load bearing structures respectively new ideas concerning energy reduced building elements and comfort oriented climate control. In the talk a systems engineering view on the specific problems in adaptive buildings is given. At first the control system in the background for the active adaptive control system for the load bearing structure is discussed. This includes the question of sensor and actuator placement, state estimation concept, fault diagnosis and control concept for actuated buildings. In case of building elements the general problem of dramatically reduced thermal mass due to the use of light weight sandwich façade elements has to be considered for the complete climate control approach. The results will be demonstrated in a 36 m high rise multi-storey building.



### Biography:

Professor Sawodny received his Dipl.-Ing. degree in electrical engineering from the University of Karlsruhe, Karlsruhe, Germany, in 1991 and his Ph.D. degree from the University of Ulm, Ulm, Germany, in 1996. In 2002, he became a Full Professor at the Technical University of Ilmenau, Ilmenau, Germany. Since 2005, he has been the Director of the Institute for System Dynamics, University of Stuttgart, Stuttgart, Germany. His current research interests include methods of differential geometry, trajectory generation, and applications to mechatronic systems. He received important paper awards in major control application journals such as Control Engineering Practice Paper Prize (IFAC, 2005) and IEEE Transaction on Control System Technology Outstanding Paper Award (2013). He is a senior member of IEEE and senior editor of Mechatronics.

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