

Sehr geehrte Damen und Herren,

hiermit ergeht die Einladung des Instituts für Regelungs- und Automatisierungstechnik zum Gastvortrag des **Herrn Univ. Prof. Dr. Markus Schöberl, JKU Linz**, mit der Bitte um Weitergabe in Ihrem Bereich:

**Titel: Recent results and open problems in flatness analysis**

**Datum:** Donnerstag, 26.03.2026

**Uhrzeit:** 16:30h bis 17:30h

**Ort:** Hörsaal i2, Inffeldgasse 12, EG, 8010 Graz

Markus Schöberl was appointed full professor and head of the Institute of Control Systems at JKU in October 2024. He received his habilitation in 2014 at the Johannes Kepler University Linz (JKU) in the field of "Control Engineering and Control Theory". His dissertation and habilitation were funded by a DOC and an APART grant from the Austrian Academy of Sciences. Markus's main research and teaching interests are in the field of geometric methods in systems and control theory and the modeling and control of nonlinear and distributed-parameter systems.

Talk at the Institute of Automation and Control, TU Graz

26 March 2026, 4:30pm

Recent results and open problems in flatness analysis

Markus Schoeberl

Institute of Control Systems

JKU Linz

Determining whether a nonlinear multi-input system is differentially flat remains challenging. One way to obtain computationally tractable sufficient conditions is to give complete characterizations of flat normal forms. In this talk we discuss several flat triangular forms for control-affine systems and provide complete geometric characterizations, i.e., necessary and sufficient conditions under which a control-affine system is static-feedback equivalent to the respective triangular form. These characterizations yield sufficient conditions for differential flatness and, in turn, constructive procedures for computing flat outputs. Furthermore, for two-input systems with a differential weight of at most two, we propose necessary and sufficient conditions for flatness. Several examples are provided to illustrate the key findings of our results.