

RATIONAL APPROXIMATION FOR DATA-DRIVEN MODELING AND  
COMPLEXITY REDUCTION OF LINEAR AND NONLINEAR  
DYNAMICAL SYSTEMS (MS - ID 69)  
~~Structured Realization Based on Time-Domain Data~~

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In this talk we present a method for constructing a continuous-time linear time-invariant system based on discrete samples of an input/output trajectory of the system. Especially, our approach allows to impose different structures on the constructed system including structures like second-order systems, systems with time-delay in the state, and fractional systems. The proposed method consists of first using the measured time-domain data to estimate the transfer function at selected points in the frequency domain by using a modified version of the empirical transfer function estimation presented in [Peherstorfer, Gugercin, Willcox, SIAM J. Sci. Comput., 39(5):2152–2178, 2017]. Afterward, we construct a structured realization based on the estimated frequency data such that the transfer function of the obtained realization interpolates the frequency data. The effectiveness of this new approach is illustrated by means of a numerical example.