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TOWARDS ON-LINE STATE TRACKING WITH DATA-DRIVEN PROCESS MODELS

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On-line optimization of manufacturing processes to increase the production efficiency is of growing interest. In order to reduce cost and improve the quality of the result the most efficient process path (optimal process parameters) has to be found. This requires on-line analysis and tracking of the evolution of the process state, based on few observable variables.
On-line state tracking with data-driven process models intends to optimize processes by learning process models to derive the state variable values (i. e. material and geometrical properties) during the manufacturing process. Process simulation is used in an observer model to perform state tracking. Common simulation methods like the finite element method or phase field models are computationally too expensive for on-line state tracking. Therefore, dimensionality reduction methods are analysed for the identification of a light-weight dynamical process model to perform state tracking in real-time. Methods such as symbolic regression are examined to identify a dynamical model based on the determined state features. The feasibility of extracting state features and identifying a reduced representation of the state is shown through numerical simulations of deep drawing process models.

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