

Preface

Results for the simplest material tests and the most complex materials forming processes often depend on complex and unknown physical models and on inherent variability of design variables. The sensitivity of results to material and process variables can be used to determine unknown variables from known results (inverse analysis and parameter estimation) as well as to determine variable settings to achieve optimal results. Numerical methods for process optimization and for solving inverse problems are being intensely and continuously developed, as the reliability and the computational efficiency of simulation software is reaching unprecedented frontiers, particularly when AI technology is applied. Innovation in this field of research, applied to all materials forming engineering disciplines, is of utmost importance for ESAFORM conference.

Papers from both numerical and experimental standpoints that fall within the scope of this issue are listed as follows.

Contributions on the following subjects are presented:

Methods for Metamodeling, Digital Twins, Control and Optimization of Forming Processes:

- shape and topological optimization;
- optimization of manufacturing processes and machines;
- process control and digital twins;
- new metamodeling techniques;
- Artificial intelligence, machine learning, deep learning and other data-driven approaches.

Inverse Analysis, Calibration and Model Discovery:

- identification of constitutive, friction, heat transfer or damage parameters;
- identification of boundary conditions or unknown process conditions;
- design of experimental procedures, specimens and measurement techniques for inverse analysis;
- numerical methods and algorithms for inverse analysis;
- Model discovery, including data-driven models, selection and identification.

Stochastic Approaches:

- reliability assessment;
- robust design;
- optimisation under uncertainty.

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