



Technion-Israel Institute of Technology
Computer Science Department
Center for Graphics and Geometric Computing



CGGC Seminar

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From Geometry to Simulation and Back: Numerical Design in Primary Manufacturing Processes

Using a mold or die, primary shaping manufacturing processes form material from an initially unshaped state (usually melt) into a desired shape. Examples of such a process are extrusion or high-pressure die casting — processes that are responsible for many products of our everyday life, from pipes to yoghurt cups. From the design perspective, what these processes have in common is that the exact design of the mold cannot be determined directly and intuitively from the product shape. This is due to the non-linear behavior of the material regarding the flow and solidification processes. Consequently, shape optimization as a means of numerical design can be a useful tool in mold development.

The core of our optimization tool is the in-house flow solver XNS, which combines a space-time method with either polynomial or isogeometric shape functions with a GLS stabilization. XNS is able to exploit the common communication interfaces for distributed-memory systems. The flow solver has been coupled with the open-source optimization frameworks NLOPT and Dakota. For geometry representation, we utilize an in-house spline library which supports both NURBS and T-splines. Spline representations are very natural in engineering design, as they allow the shape optimization result to be easily transferred back into the CAD-based design process. Furthermore, they require a low number of optimization parameters and allow the incorporation of manufacturing constraints. Isogeometric analysis aligns well with this type of shape-optimization.

Topics discussed will be our approach to shape optimization as well as methods for simulating the flow through, in and behind the mold/die. The importance of the geometrical representation and the resulting challenges in this area will be emphasized.

The lecture will be held on Wednesday, 05.09.2018, at 13:30, Taub 401

הזמנה זו מהווה אישור כניסה עם רכב לטכניון