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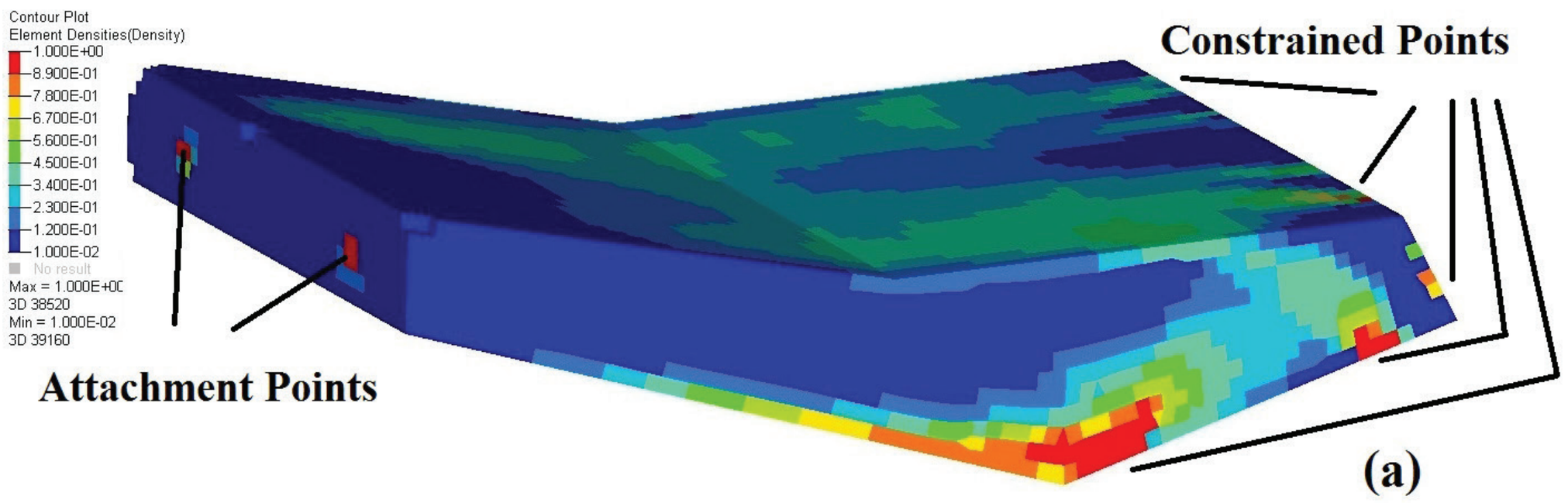
Future of Lightweighting Entry



University of Toronto

PSO-Based Multidisciplinary Design Optimization of Automotive Assemblies

Design and optimization of automotive structures typically follows a sequential approach in which the topology of the part is proposed first based on the designer's experience. Later, the shape of the part may change to meet the structural performance criteria and finally the thickness may be altered for stamping and extrusion parts. This often results in many iteration loops in order to arrive at the final design and it is heavily dependent on the experience of the designers. Furthermore, the design space will not be used efficiently since the designers will only explore a handful of ideas due to time constraints of developing a new product. The proposed framework is meant to address this problem through using a Multidisciplinary Design Optimization approach in which the sequential scheme is turned into a parallel one with the capability of searching the design space more efficiently in a systematic way. The search is performed by a nature-inspired algorithm (Particle Swarm, PSO) which utilizes randomization and gains knowledge about the optimal solution as it proceeds. Therefore, this framework can be effectively employed to design and optimize lightweight structures in a semi-automated fashion.

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