

# **Prediction of Local Deformation Modes and Fractures for Automotive frames using the Isogeometric Analysis**

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## **ABSTRACT**

Generally, current shell elements of FEM use bilinear shape functions. However, they are difficult to predict a complicated local deformation with high accuracy. To resolve these problems, Isogeometric analysis considered. First, to investigate the applicability of Isogeometric analysis in crashworthiness, simplified models were utilized. They contain S-frame model for collapse problem, 3-point bending model for fracture, spot weld models for failure and rectangular cross-section model for axial deformation. These simulation results based on the Isogeometric analysis correlated well with the experimental tests. Next, Isogeometric optimization tool to comprehensively transfer the data between CAD and Isogeometric analysis was developed by the authors. Using this optimization tool, practical automobile frames were created. It was found that modeling speed was faster than conventional FEM and Isogeometric results correlated well with experiments.