CRASH LOAD PATHS ANALYSIS BASED ON FIELD LINE VISUALIZATION IN META POST-PROCESSOR

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ABSTRACT
In order to fulfil the increasing legal and customer demands on safety requirements of the automobiles, the virtual development process based computational methods is utilized to optimize structural and restraint system performance in the crash. The improving reliability of these crash simulation provides the engineers with valuable information which is even not accessible in the hardware test.

In the virtual vehicular crashworthiness design process, the main energy absorption and the safety of the passenger compartment are assured by the force levels and deformation potentials along the so-called load paths. If the crashworthiness relevant components are aligned with the direction of impact, the load paths can be identified based on engineering judgement. However, during a crash event, plastic deformations of these components give rise to buckling, time-dependent contacts, rotations and failure of the structures, making the load path analysis challenging.

In this research project, we utilize a modified dual-prime streamline seeding algorithm to generate field lines representing the load transfer along the structure, which is subjected to dynamic loading and non-linear deformation. The visualization of the load transfer in MEAT Post-processor, i.e. the color coding, distribution, flow direction and lengths of the field lines, can help the engineer to identify the load paths, thus to extract the load bearing structure for further engineering design work.