CRASHWORTHINESS PARAMETRIC SHAPE OPTIMIZATION WITH THE MACRO ELEMENT METHOD

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When crashworthiness is an important aspect for a structure, e.g. vehicle structures, certain structural components are designed as energy absorbers. Shape optimization can be used for the design of such components, using for example explicit FEM for the evaluation of crash responses. While FEM is a well known and reliable method, it is also known to be computationally expensive due to the non-linearities of crash. This paper presents an alternative and faster approach for the evaluation of crash responses in parametric shape optimization, using Super-Folding Elements from the Macro Element Method (MEM) developed by Abramowicz and Wierzbicki [1] [2] [3]. A parametric benchmark model with shape design variables is used for the optimization. Accuracy and computation time is compared between FEM and MEM within a parametric shape optimization run.

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