NEW DEVELOPMENTS FOR MODELING CONNECTED PARTS OF THE BODY IN WHITE: SPOT WELDING AND ADHESIVE BONDING IN CRASH SIMULATIONS WITH LS-DYNA

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Abstract

The increasing demands with regard to the predictive capabilities and the exactness of crash simulations require more and more investigations into numerical models in order to capture the physical behavior reliably. Steps towards this goal are the usage of finer meshes which allow for a better geometrical representation and more sophisticated material models which allow better prediction of failure scenarios. Another important playground towards improved crash models is the area of connection modeling. Validation in this area is usually closely related to very detailed models which cannot be easily translated into a crash environment due to time step restrictions. Therefore, representative substitute models have to be developed and foremost validated. Different test setups are used for verification and validation. For validation of the developed procedure T-section component tests are generally used. The aspect that failure of the connections has to be considered as well adds another dimension to the complexity of the task. Here a new failure envelope has been developed and implemented into LS-DYNA.
The present paper highlights the conflict between predictive capability, capture of physical reality and numerical manageability. Another aspect of the paper is the attempt to raise the awareness of the topics verification and validation of numerical models in general. This concept is illustrated using latest developments for modeling of spotwelds and adhesive bonding in LS-DYNA.

Keywords: LS-DYNA, Crash Simulation, Spotwelds, Adhesives, Failure, Explicit Finite Element Method.

Presenting Author's biography

André Haufe studied civil engineering at the Universities of Stuttgart, Germany, and Calgary, Canada. He holds a Ph. D. of the University of Stuttgart in the field of computational mechanics and is lecturer at the Institute of Statics and Dynamics for Aeronautical Structures (ISD) at the same University. After a one year post-doctoral research in Canada he joined DYNAmore in 2002. His interests are in the fields of constitutive models, modeling techniques and the forming-to-crash simulation process chain. Dr. Haufe is currently appointed the position of Manager Process Engineering at DYNAmore GmbH.

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