

Advancements in the simulation of magnetic pulse forming processes with FORGE®

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Abstract

In this work the latest developments on the electromagnetic (EM) module of FORGE® and the derived improvements for simulating the magnetic pulse forming process are presented. The following aspects are covered: advanced material description for high intensity magnetic fields where coupling with the material data base software JMatPro® is extended to account for the EM phenomena; Integration of the forming limit diagrams (FLD) for analysis of thin sheets forming; improved meshing/remeshing for large displacements in the fully immersed multi-objects approach, where a particular focus is given to the fields transfer stage, showing how the overall CPU time can be reduced by half or more; Introduction of an advanced 2nd order time-stepping integration method based on an asynchronous interpolation that was previously developed for thermal-shock problems and is now extended to the computation of EM fields showing excellent convergency and stability properties.

Keywords: Magnetic Pulse Forming, Finite elements