Development of an inverse method for the identification of the elasto-plastic behavior of plate-like materials

Ioannis Vasilakos

The extensive use of virtual prototyping and virtual simulations of forming processes in industry require more and more accurate material models. Although standard tests have proven their value in the engineering world, it has been found that simple standard tests may yield insufficient values for complex processes like sheet metal forming. Due to the increase of computer power, some problems can nowadays be solved with the use of so called “inverse methods” or “mixed numerical-experimental methods” (MNEM's). The main goal of this thesis is to develop an efficient inverse method for the identification of the linear elastic and elastoplastic behavior of sheet metals. Although it is proven by several researchers that MNEM's may provide material parameters with increased accuracy, problems like the good choice of a material model and starting values remain to be addressed. The inverse method proposed in this thesis allows the simultaneous examination of different material models or even the formulation of new material models to describe the elastoplastic behavior. In addition, the proposed method is nearly not dependent on the presence of good starting values for the identification of the elastoplastic behavior. The proposed method is validated through a series of virtual and real experiments taking into account the influence of several sources of errors.