Higher Order Shell Elements for Sheet Metal Forming Simulations

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ABSTRACT

In sheet metal forming simulations, Reissner-Mindlin shell elements or three-dimensional 7-parameter shell elements are typically taken into account. Both are based on the assumption that straight cross-sections remain straight. However, for some applications, like bending with small radii or thick sheets, this approach is not a workable solution, since warped cross-sections and highly non-linear stress distributions through the thickness can occur [1]. A promising alternative is to use higher order shell elements, which allow for a deformable cross section and higher order stress distributions through the thickness [2].

The current state of development of such elements for sheet metal forming simulations is presented in this contribution. Furthermore, we discuss ideas to identify the most relevant deformation modes for a higher order shell element in order to obtain a favorable convergence behavior [3].

REFERENCES

