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# EXACT GEOMETRY ELEMENTS FOR SEVEN-PARAMETER SHELL MODEL WITH IMPLICITLY DEFINED REFERENCE SURFACE

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The aim of this contribution is to present a finite element approach for a seven-parameter shell model, where the reference surface is given implicitly as the zero-level set of a level set function. The main feature of our work is that the exact geometry of the shell is used in the simulation. This is in contrast to classical approaches where the shell geometry is approximated by flat (faclet) or quadratic elements. For parametrically defined reference surfaces exact geometry methods have been proposed [1]. An important special case of this setting is given by isogeometric shell analysis where the parametrization is realized by NURBS. For the present case of an implicitly given reference surface the exact geometry can be achieved by a two step procedure [2]. In the first step an approximating triangulation is obtained by the marching cube algorithm. In the second step this triangulation is mapped to the exact geometry by a implicitly defined mapping, i.e. it requires the solution of a nonlinear root-finding problem. Due to the present seven-parameter shell model we are able to utilize higher-order $H^1$-conforming shape functions defined on the reference triangle within a displacement based formulation. We verify the proposed approach using manufactured solutions and show the capabilities at further examples.

## REFERENCES

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