It is well known that the \( p \)-version finite elements exhibit faster convergence over the conventional \( h \)-version, which means more accurate results can be reached by using lesser DOFs. This property is very helpful to the time saving of nonlinear problems because we can acquire accurate results but use lesser DOFs in the iteration process of nonlinear solving. However, the high accuracy of \( p \)-version finite elements requires the high accurate modelling of geometry, which means elements with curved boundaries are essentially demanded for problems with irregular domains. This requirement can be easily satisfied in \( C^0 \) finite elements. However, it is very difficult for \( C^1 \) elements because of the conformity problem. In our recent work, both quadrilateral and triangular elements with curved boundaries were developed, and linear testing problems of Kirchhoff plates were analysed there. In this work, these elements are reformulated for the finite deformation analysis of Kirchhoff–Love shells based on the geometrically exact shell theory. Benchmark problems are employed to verify the fast convergence as well as high accuracy of present elements. Besides, shells with complicated cut-outs and material discontinuity are also analysed by the blending use of the curved quadrilateral and triangular elements.

**Keywords**: \( p \)-version FEM, \( C^1 \) finite elements; Kirchhoff–Love shell; finite deformation.

REFERENCES

