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A LOCAL SMOOTHED MIXED FORMULATION FOR ISOGEOMETRIC NON POLAR THIN STRUCTURAL MODELS

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Assumed membrane strains are used in the context of mixed formulations for avoiding membrane locking in non polar thin structural models like rods and shells. In the context of B-spline interpolation for isogeometric analysis, assumed membrane strains are in this work introduced locally in each element with a local L^2-projection. The procedure is much more efficient than a projection performed on the global B-spline like in [2]. Successively, the spline reconstruction algorithm, developed by Thomas et al. in, is employed for reconstructing the membrane strain at the global patch level. In this way, contrarily to what happens with the standard $\bar{B}$ formulation for isogeometric analysis, a banded stiffness matrix is obtained that strongly reduces the computational cost. The main advantages of the proposed method are: the reproduction of regular membrane strain fields, an accurate membrane locking-free solution and an high computational efficiency with respect to standard $\bar{B}$ formulation.
The method can be applied for any polynomial degree of the B-spline interpolation, and for k-refinement operations. The effectiveness of the proposed method is demonstrated analyzing some bending and membrane dominated problem, commonly employed as benchmark in the rod and shell literature.

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