

GEOMISO ISA: A HYBRID SOFTWARE FOR ISOGEOMETRIC ANALYSIS WITH PLATE ELEMENTS AND ADVANCED SPLINE TECHNIQUES

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In this paper, we propose the Geomiso ISA software (www.geomiso.com), a new program for applications on static isogeometric analysis with plate elements and advanced spline techniques. This hybrid software is based on the isogeometric method, the powerful generalization of the traditional finite element analysis, which is becoming essential tool for construction industry, as it utilizes CAD geometry to facilitate analysis with plate elements. This is especially beneficial for building processes, as it lays the foundation for a consistent information flow for interactive design and analysis. More specifically, structural isogeometric analysis perfectly fits in slab structures, such as domestic and industrial buildings.

The recently developed Geomiso ISA program is applicable to real world and industry applications, using advanced spline techniques. NURBS are ubiquitous in CAD industry, while the most promising spline technology is T-splines, which overcome limitations inherent to NURBS. It is used to simulate spline models of slabs and analyze their strength and behavior. This solution addresses the rising industrial need for seamless integration of CAD and CAE, while it appears to be a more efficient alternative to FEA software packages, as it offers an innovative way to design slabs as tensor product grids with its modern user interface in contrast to design programs.

Real world and industry applications on thin (Kirchhoff-Love) and thick (Mindlin-Reissner) plates are demonstrated with a comparison between plate and hexahedral elements. We compare the accuracy of the numerical results, such as displacement, strain and stress fields, and the stiffness matrix assembly and solver time for analysis of typical slab types widely used in construction. This hybrid software is proved to be a viable alternative to traditional finite element software packages, as higher accuracy, robustness, and stability level are accomplished.

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