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Jupyter extension for creating CAD designs and their subsequent analysis by the finite element method

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Creating designs in CAD and performing their stress-strain analysis are complex computational tasks. Their successful solution depends on a number of prerequisites: availability of large computational power; comprehensive knowledge of physical and mathematical computing; and solid skills of programming and working in a variety of separate software products that are not integrated to each other directly.

The paper presents a system aimed at CAD models development and verification from the ground up. The system integrates geometry construction, mesh model creation and deformation analysis into a uniform computing environment operating as a SaaS solution. It is based exclusively on open source software and allows to use the Python programming language and SALOME, GMSH, FEniCS and ParaView libraries. The system's architecture and certain issues of working with libraries are discussed. The paper also presents a browser-based tool for CAD design creation and analysis, which tool is the front end of the software product we created.

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