

# MASTER'S DISSERTATION AT STRUCTURAL MECHANICS

DEPARTMENT OF CONSTRUCTION SCIENCES | FACULTY OF ENGINEERING LTH | LUND UNIVERSITY



**ANDREAS ÅMAND**  
vov15aam@student.lu.se

## PRESENTATION

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## SUPERVISOR

Dr **JONAS LINDEMANN**  
Div. of Structural Mechanics, LTH | Lunarc

## ASSISTANT SUPERVISOR

**KARIN FORSMAN** Lic Eng  
Div. of Structural Mechanics, LTH

## EXAMINER

Dr **OLA FLODÉN**  
Div. of Structural Mechanics, LTH

**THE WORK IS PERFORMED AT**  
DIVISION OF STRUCTURAL  
MECHANICS, LTH

**IN COOPERATION WITH**  
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# DEVELOPMENT OF FUNCTIONS FOR VISUALIZATION IN CALFEM FOR PYTHON

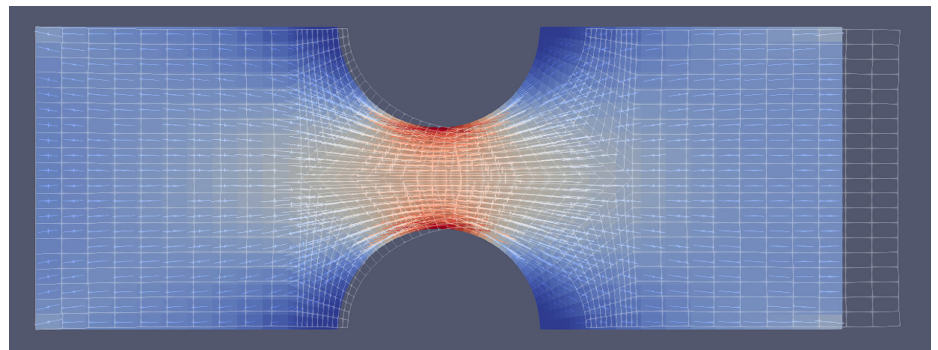


Figure 1 – Example of visualization of a stress problem in Paraview (Jonas Lindemann, 2021)

## BACKGROUND

In FE modeling, good tools for visualizing results are very important. Different models and analyses also require visualization of results in different ways. Having good visualization tools aid the understanding of the results. CALFEM for Python is a FE toolbox used for teaching in structural and solid mechanics. The current tools for visualization of results don't cover all cases and need to be updated, along with addition of functionality for a wider range of problems. This added functionality will aid students in the understanding of the FE method. Additional functionality for visualization in CALFEM for Python along with functions for exporting results to more powerful visualization tools will give users options and streamline the workflow for visualization. When an export of results to more powerful visualization tools is needed, having functions that make this easy is also helpful. Implementing this functionality into CALFEM for Python will make coursework for relevant problems easier by streamlining the visualization, allowing students and teachers to focus on the FE problem at hand.

## AIM

The main aim of the project is to improve visualization tools in CALFEM for Python. Existing tools for visualization will be im-

proved with regard to functionality and usability. Further functionality for visualizing results will be added with care taken to what kinds of visualization tools would be useful in teaching. Functionality for easy export of results to more powerful visualization tools such as Paraview will be added. If possible, developed tools will also be able to visualize results from CALFEM for MATLAB.

## METHOD

The project will begin with a literature study to research existing libraries for visualization in Python. From this study, libraries that could be useful for implementing visualization functionality in CALFEM for Python will be studied. After researching, existing functions in CALFEM for Python will be examined and improved for usability. Using what is obtained from the literature study, further functionality for visualization along with examples will be implemented into CALFEM for Python. Export tools for Paraview and possibly other visualization tools will be implemented alongside the improved visualization tools. If possible, a study of what specific problems need visualization in coursework will be conducted and tools implemented in accordance with these requests.

## DIVISION OF STRUCTURAL MECHANICS

Faculty of Engineering LTH, Lund University, Box 118, SE-221 00 Lund, Sweden

• Tel: + 46 (0)46-222 73 70 • Fax: + 46 (0)46-222 44 20 • www.byggmek.lth.se

