Assignment 7

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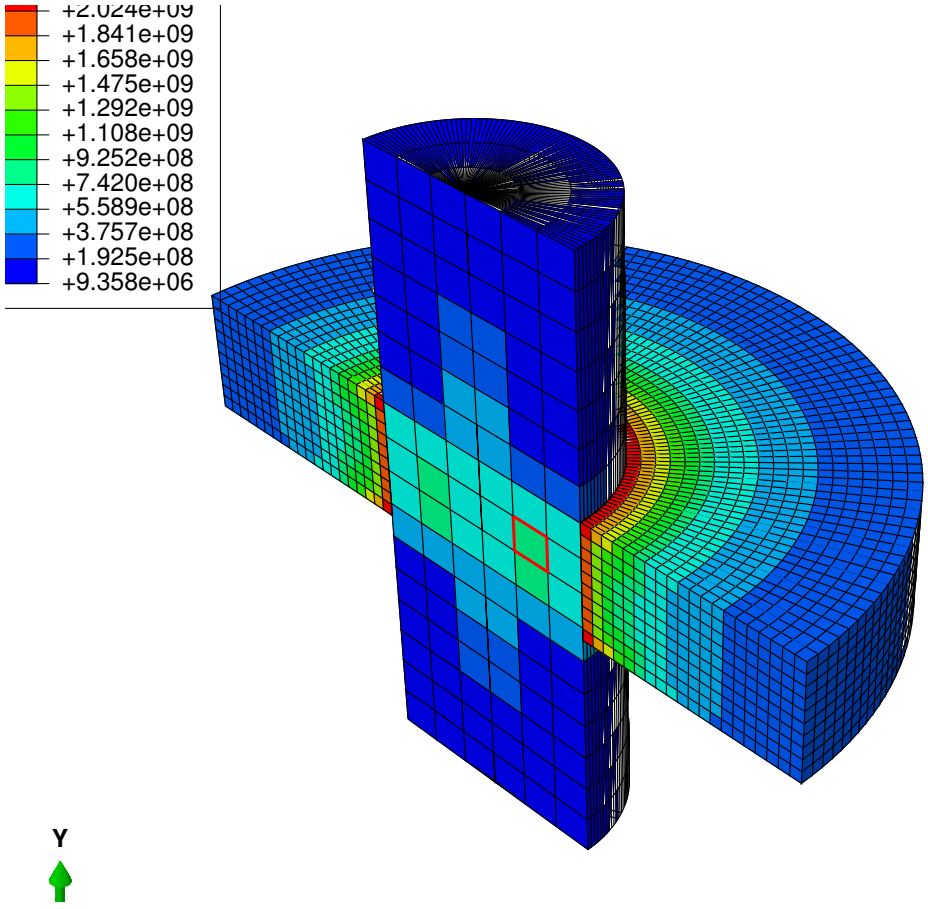
Finite Element Analysis I

May 21, 2019



Abstract

In this assignment we investigate the behaviour of a cooling disk which is mounted on a shaft.

Contents

1 Introduction

The disk is heated up to increase its diameter, then cooled down to form an interference fit. This is a common procedure in mechanics to fit parts together (e.g. bearings on shafts). It is therefore interesting to know, by how much the disk has to be heated in order to get an inside diameter which fits over the shaft. In a practical application, this could be used to specify manufactoring tolerances.
As shown in Figure **??**, the fibers are orientated differently in both simulations.

2 Methods

2.1 Analyzing the data with Python

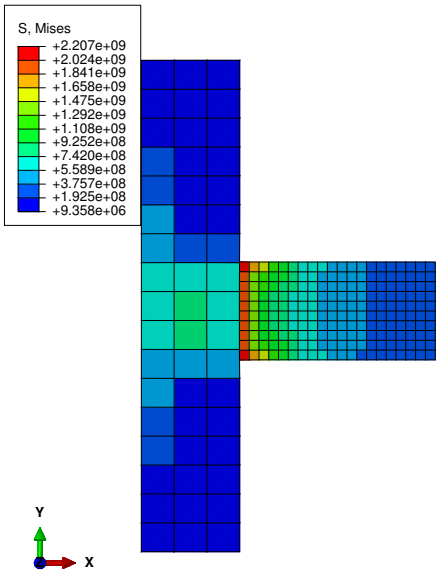
We created a model with CPS4R mesh type. Based on the last assignments, the reduced integration gave us the best result, so we stick with that.

2.2 Holzapfel-Gasser-Ogden Framework

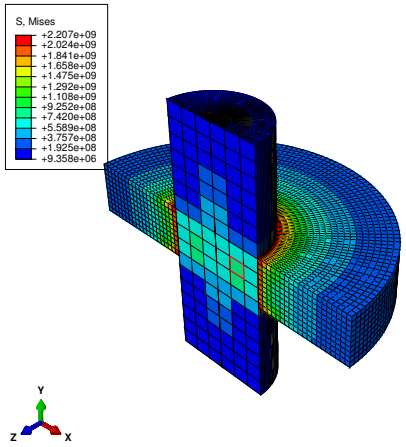
We use the Holzapfel-Gasser-Ogden approach to model the biomechanical behaviour of our sample. This approach targets the anisotropic behaviour of the material with multiple layers of fibers at different angles. This is required in order to achieve a relatively realistic distribution of forces and strains within the sample.[2]

3 Results and Discussion

The results are



(a) Stresses with



(b) Stresses with

Figure 1: Stresses on Sample

3.1 (

conclution)

References

[1] Michel Goossens, Frank Mittelbach, and Alexander Samarin. *The LaTeX Companion*. Addison-Wesley, Reading, Massachusetts, 1993.

[2] Michel Goossens, Frank Mittelbach, and Alexander Samarin. *On the Use of Biaxial Properties in Modeling Annulus as a Holzapfel–Gasser–Ogden Material*. Sharaki et al., University of Toledo, Toledo, OH, USA, 2015.