Pressurized Vessel Stress Analysis Solution Verification Study

root

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Abstract

This report mocks a Solution VERification (SVER) study of a pressurized vessel stress analysis.

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Chapter 1

Introduction

This report summarizes one instance of the Pressure Vessel exemplar. The model is an analytic double series displacement field for a pressurized cylindrical partially filled with fluid. Strains and stresses are also calculated. Boundary conditions are simple support at the ends of the vessel (zero displacement, zero reaction moment).

Chapter 2

Analysis Workflow Structure

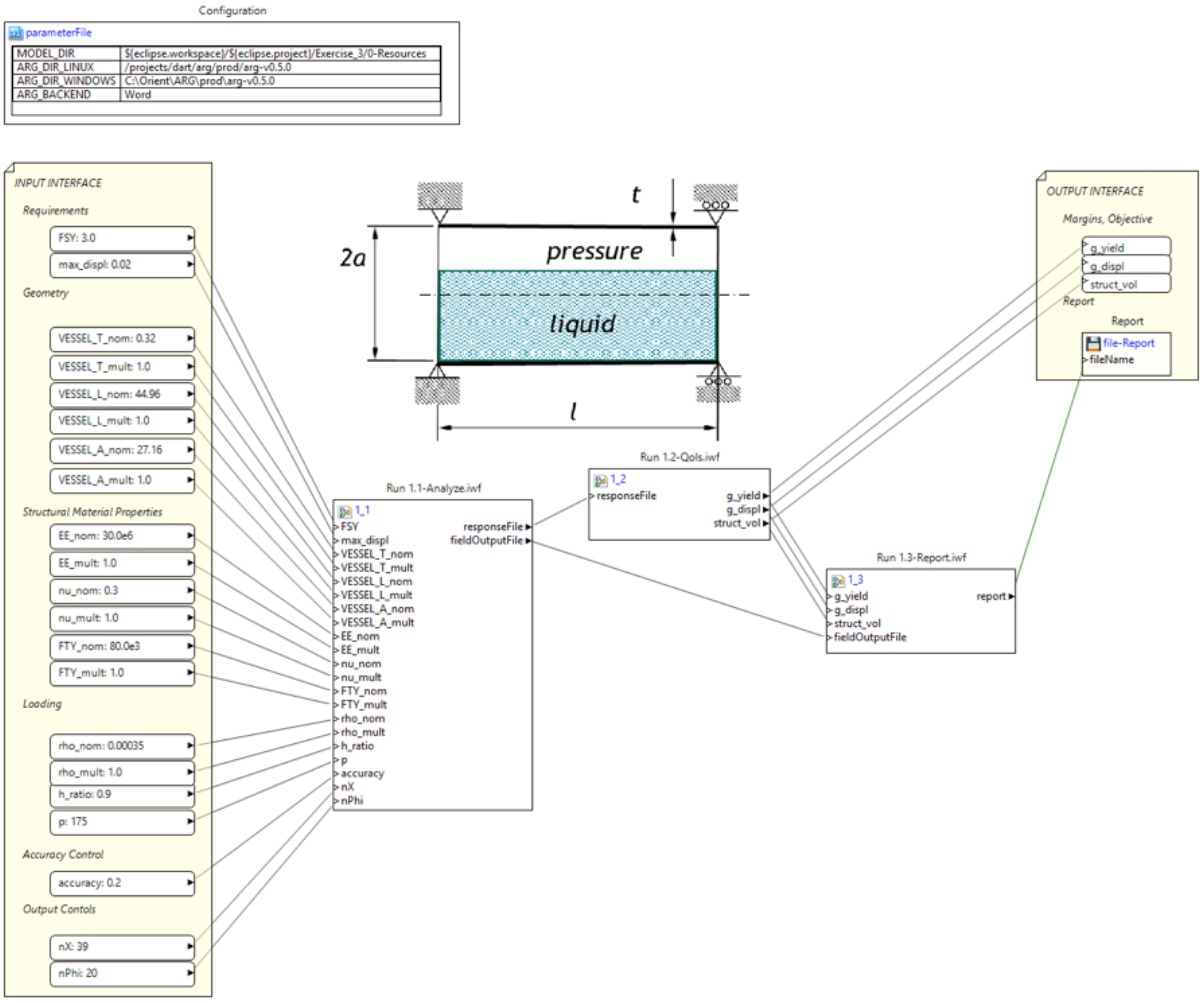

Figure 2.1: 1.0-Construct

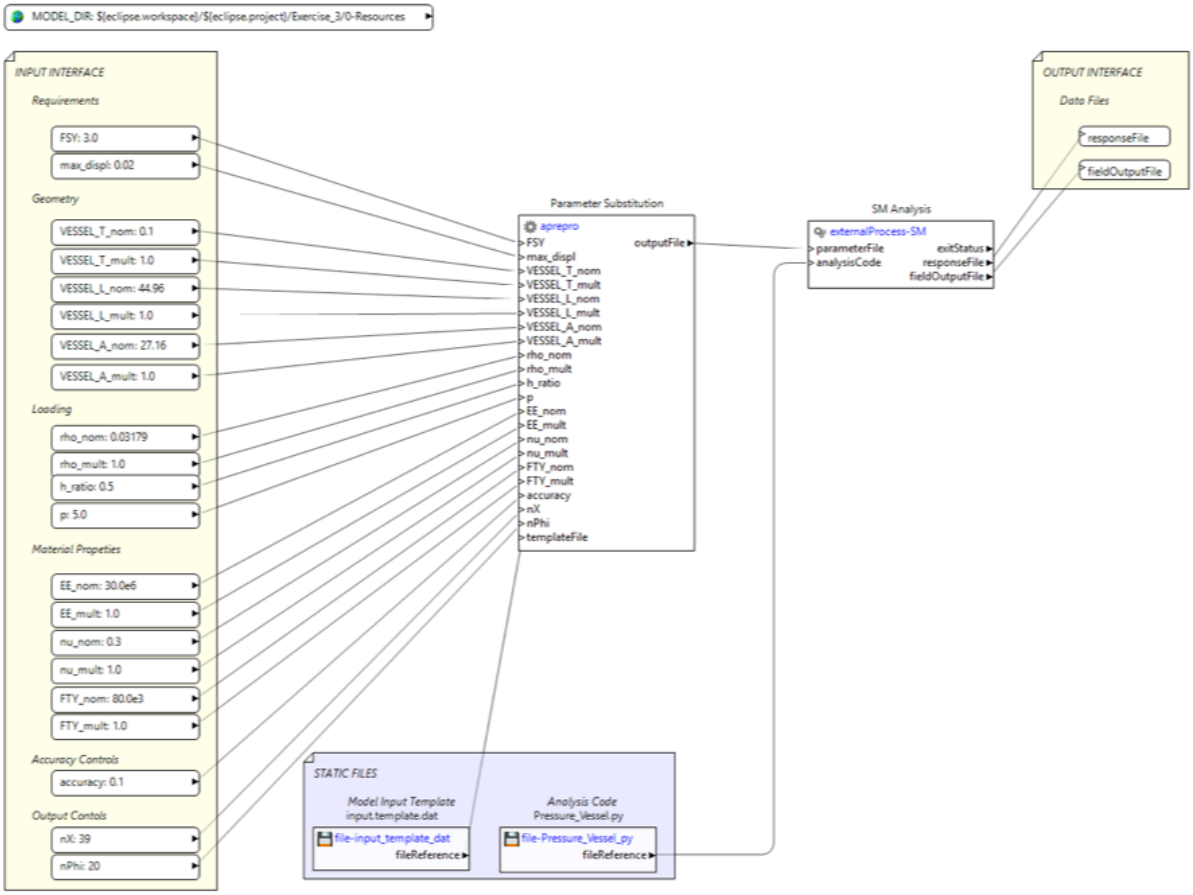

Figure 2.2: 1.1-Analyze

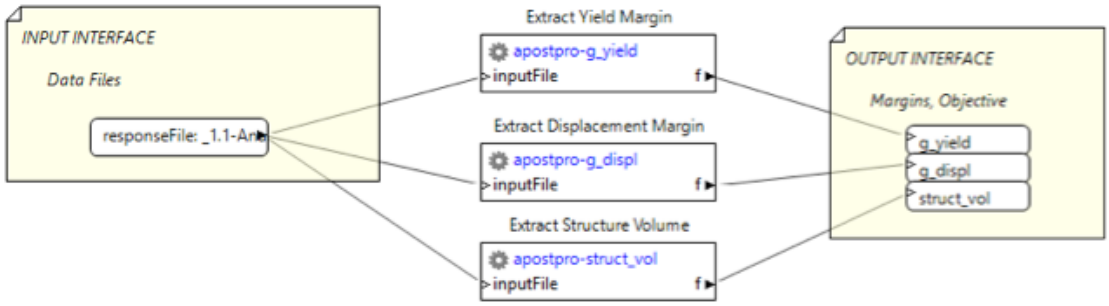

Figure 2.3: 1.2-QoIs

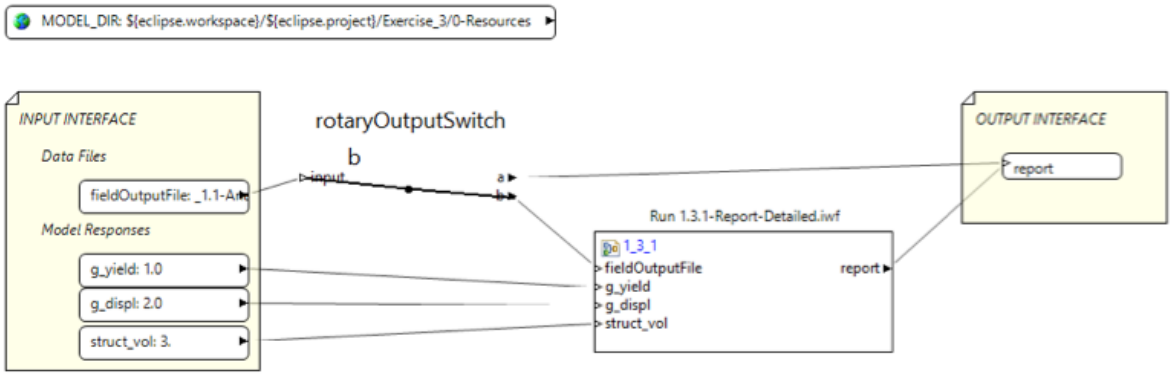

Figure 2.4: 1.3-Report

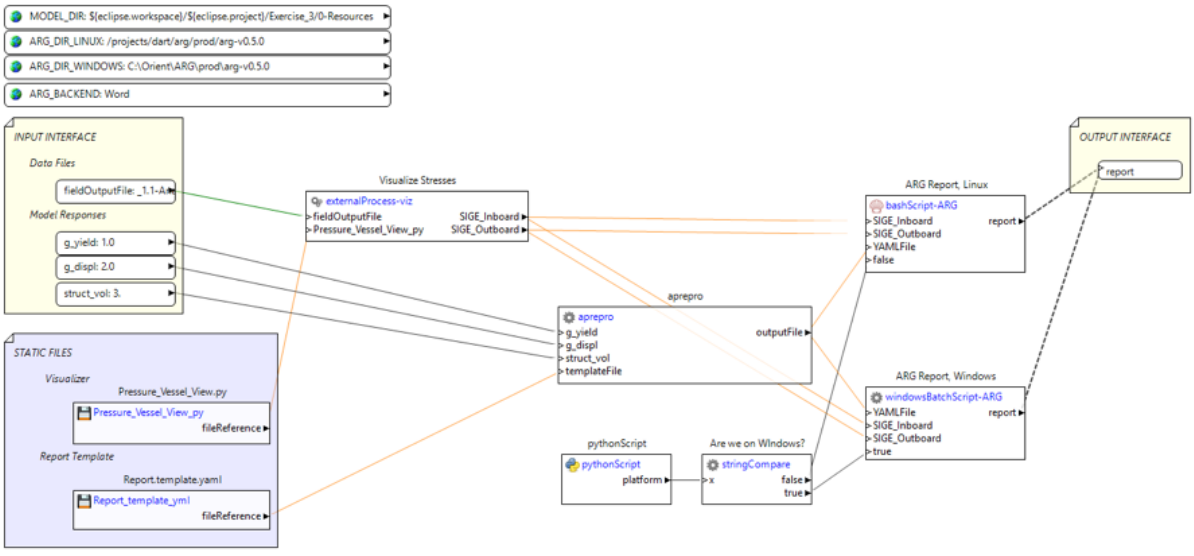

Figure 2.5: 1.3.1-Report-Detailed

Chapter 3

Study Definition

List study with the following points:

property	value
number of attributes	74
number of datasets	28
number of groups	44

Table 3.1: Meta-information of `dakota_results.h5`

Chapter 4

Study Workflow Structure

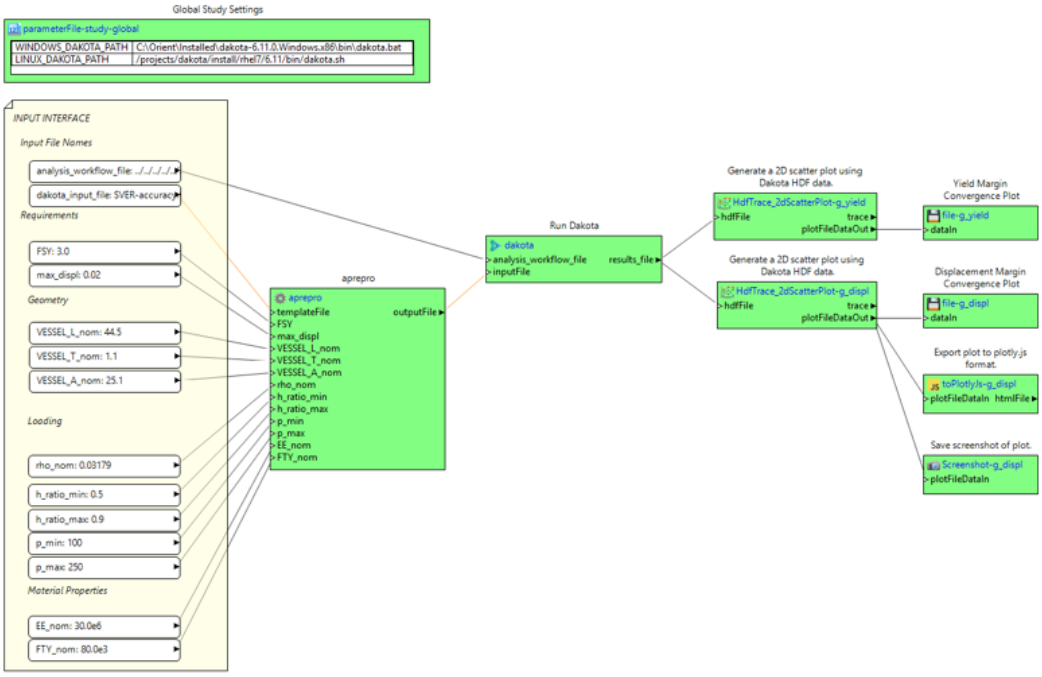

Figure 4.1: 100% Solution-Verification-Workflow

Chapter 5

Results -- Sample 1

5.1 Model Parameters

key	value
accuracy	1.000000000000000e-02
h_ratio	9.000000000000000e-01
p	2.500000000000000e+02
FSY	3.000000000000000e+00
max_displ	2.000000000000000e-02
VESSEL_L_nom	4.450000000000000e+01
VESSEL_A_nom	2.510000000000000e+01
VESSEL_T_nom	1.100000000000000e+00
rho_nom	3.179000000000000e-02
EE_nom	3.000000000000000e+07
FTY_nom	8.000000000000000e+04

Table 5.1: Values for `params.txt`.

5.2 Quantities of Interest

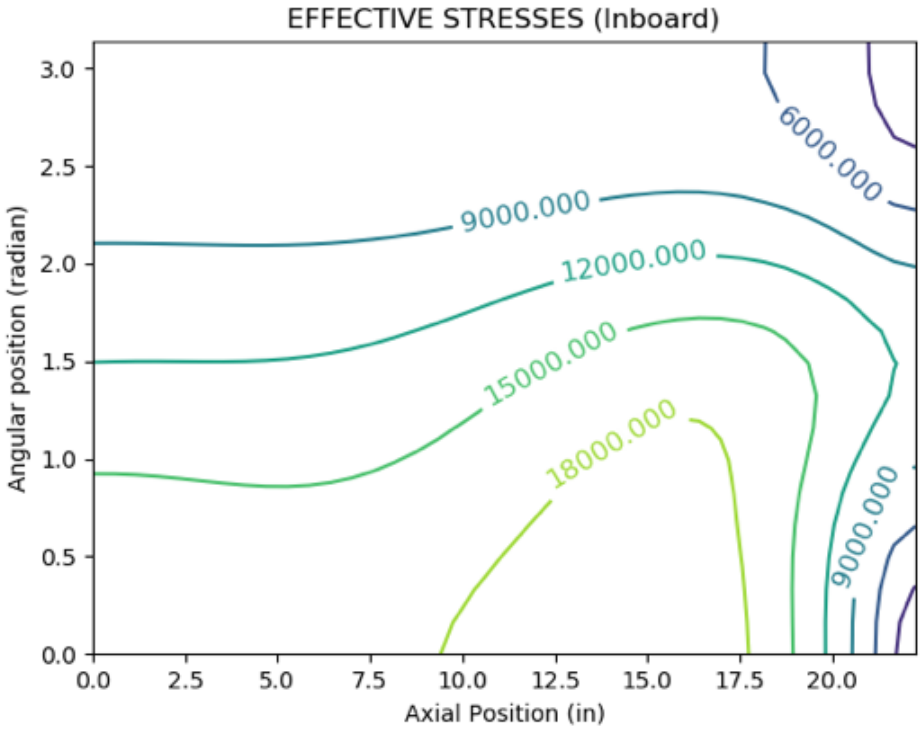

Figure 5.1: Sample 1 - Contour plot of the inboard von Mises stress (psi)

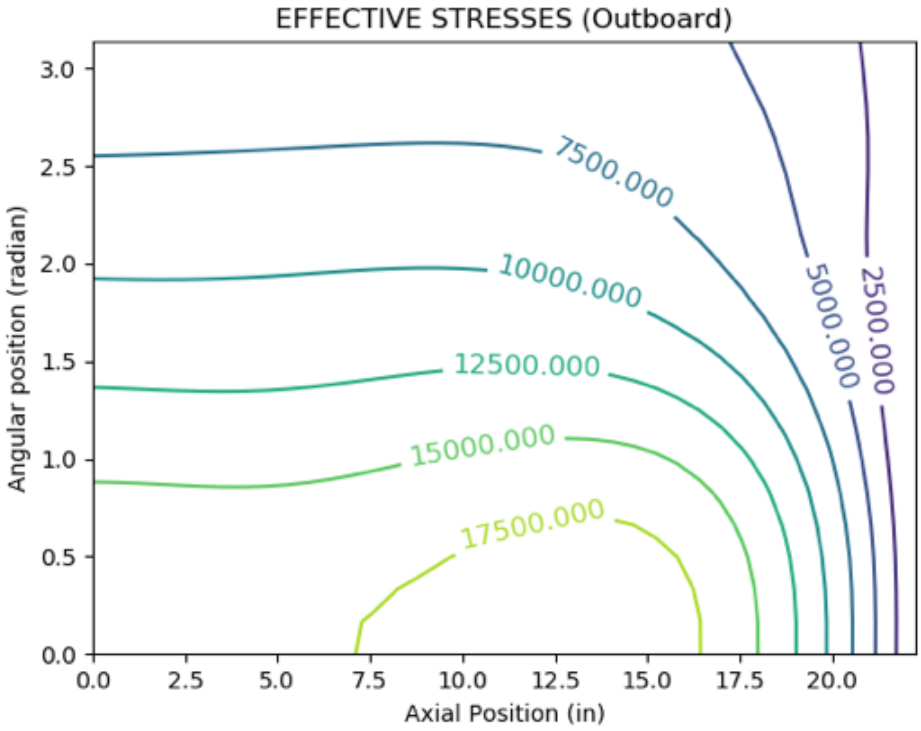

Figure 5.2: Sample 1 - Contour plot of the outboard von Mises stress (psi)

Chapter 6

Results -- Sample 2

6.1 Model Parameters

key	value
accuracy	1.500000000000000e-02
h_ratio	9.000000000000000e-01
p	2.500000000000000e+02
FSY	3.000000000000000e+00
max_displ	2.000000000000000e-02
VESSEL_L_nom	4.450000000000000e+01
VESSEL_A_nom	2.510000000000000e+01
VESSEL_T_nom	1.100000000000000e+00
rho_nom	3.179000000000000e-02
EE_nom	3.000000000000000e+07
FTY_nom	8.000000000000000e+04

Table 6.1: Values for `params.txt`.

6.2 Quantities of Interest

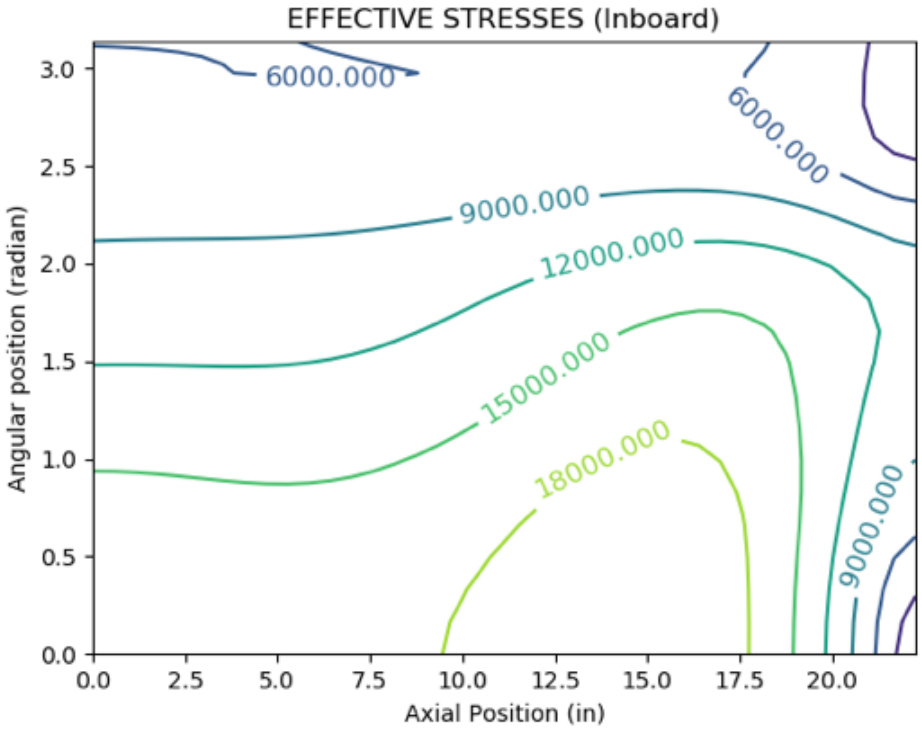

Figure 6.1: Sample 2 - Contour plot of the inboard von Mises stress (psi)

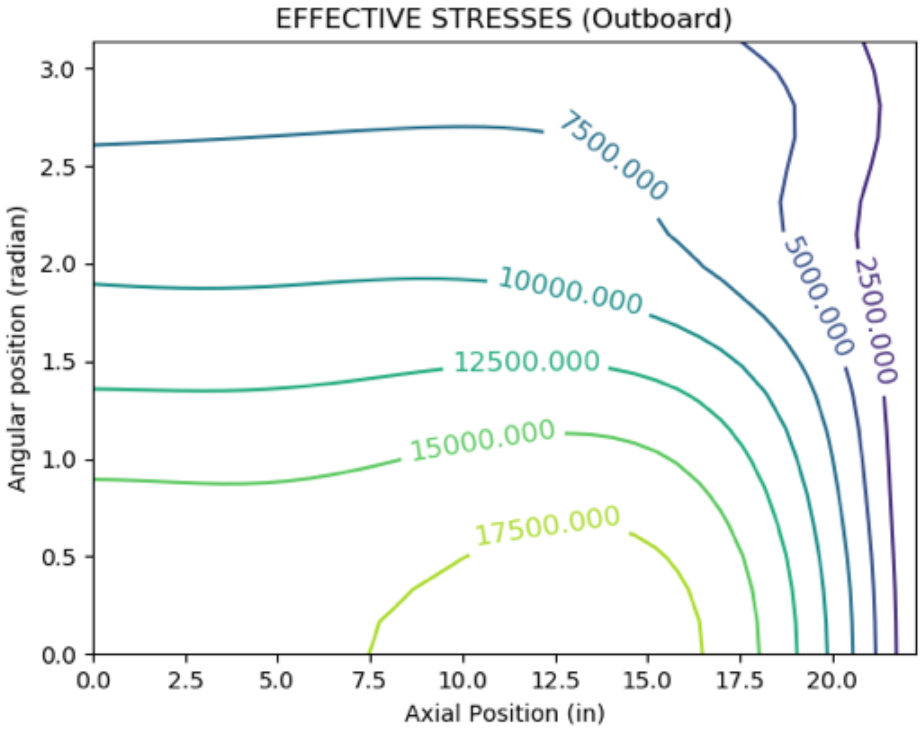

Figure 6.2: Sample 2 - Contour plot of the outboard von Mises stress (psi)

Chapter 7

Results -- Sample 3

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Chapter 8

Ensemble Results

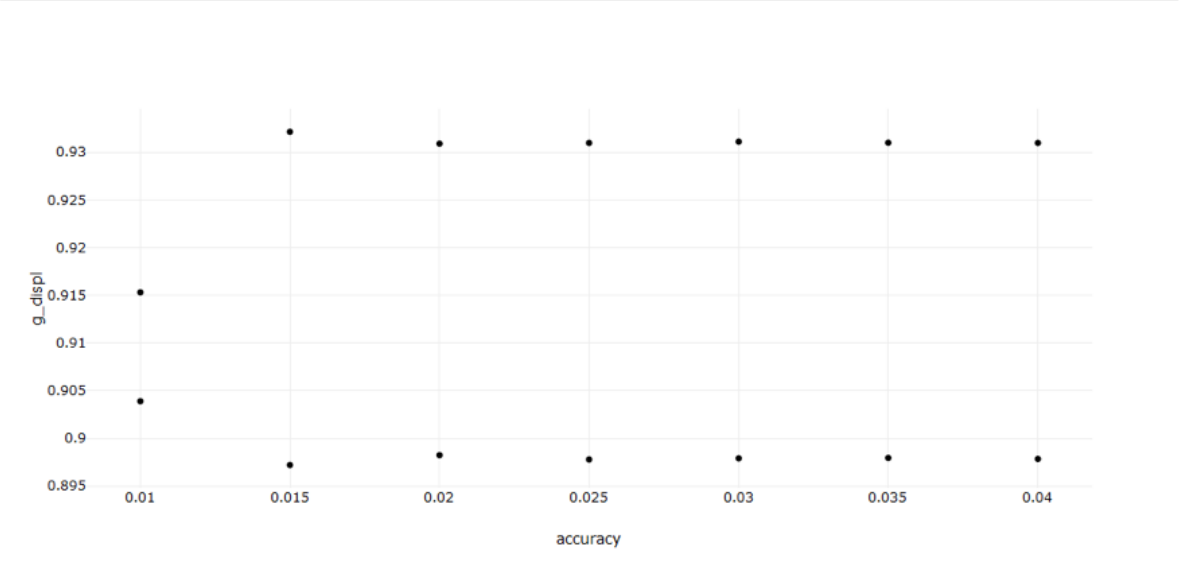

Figure 8.1: Displacement Margin Solution Verification

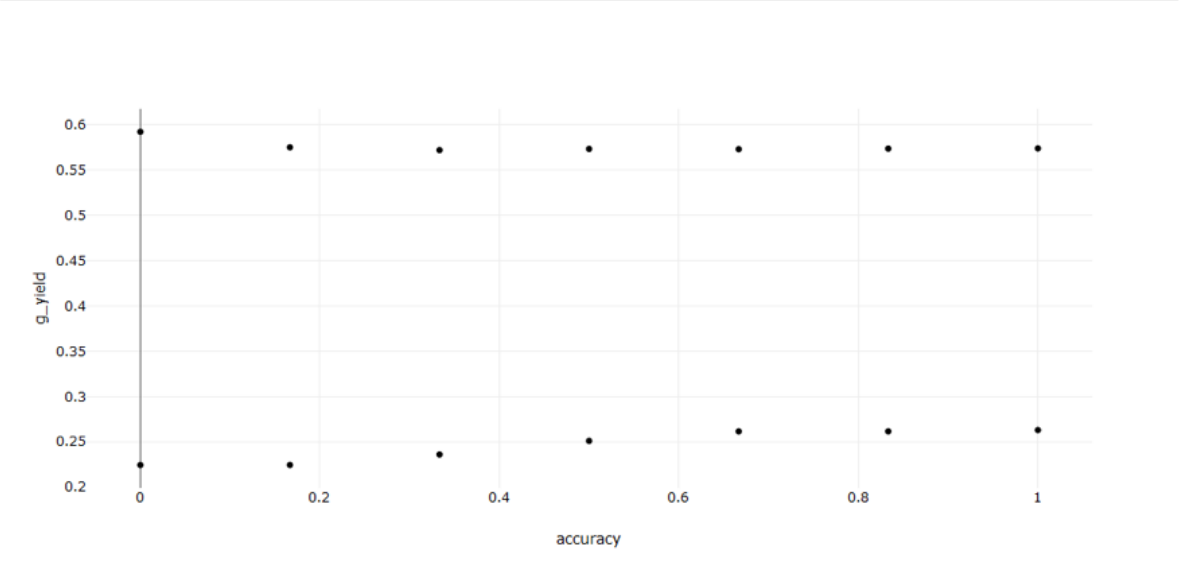

Figure 8.2: Stress Margin Solution Verification