

Pressurized Vessel Stress Analysis Solution Verification Study

root

March 26, 2021

This document was generated on 2021-03-26, 15:24:00 with the Automatic Report Generator (ARG) version "develop" on the Linux system `runner-72989761-project-18732201-concurrent-0`.

Abstract

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

Contents

1	Introduction	4
2	Analysis Workflow Structure	5
3	Study Definition	8
4	Study Workflow Structure	9
5	Results – Sample 1	10
5.1	Model Parameters	10
5.2	Quantities of Interest	10
6	Results – Sample 2	13
6.1	Model Parameters	13
6.2	Quantities of Interest	13
7	Results – Sample 3	16
8	Ensemble Results	17

List of Figures

2.1	1.0-Construct	5
2.2	1.1-Analyze	6
2.3	1.2-QoIs	6
2.4	1.3-Report	7
2.5	1.3.1-Report-Detailed	7
4.1	Solution-Verification-Workflow	9
5.1	Sample 1 - Contour plot of the inboard von Mises stress (psi)	11
5.2	Sample 1 - Contour plot of the outboard von Mises stress (psi)	12
6.1	Sample 2 - Contour plot of the inboard von Mises stress (psi)	14
6.2	Sample 2 - Contour plot of the outboard von Mises stress (psi)	15
8.1	Displacement Margin Solution Verification	17
8.2	Stress Margin Solution Verification	18

List of Tables

3.1	Meta-information of <code>dakota_results.h5</code>	8
5.1	Values for <code>params.txt</code>	10
6.1	Values for <code>params.txt</code>	13

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

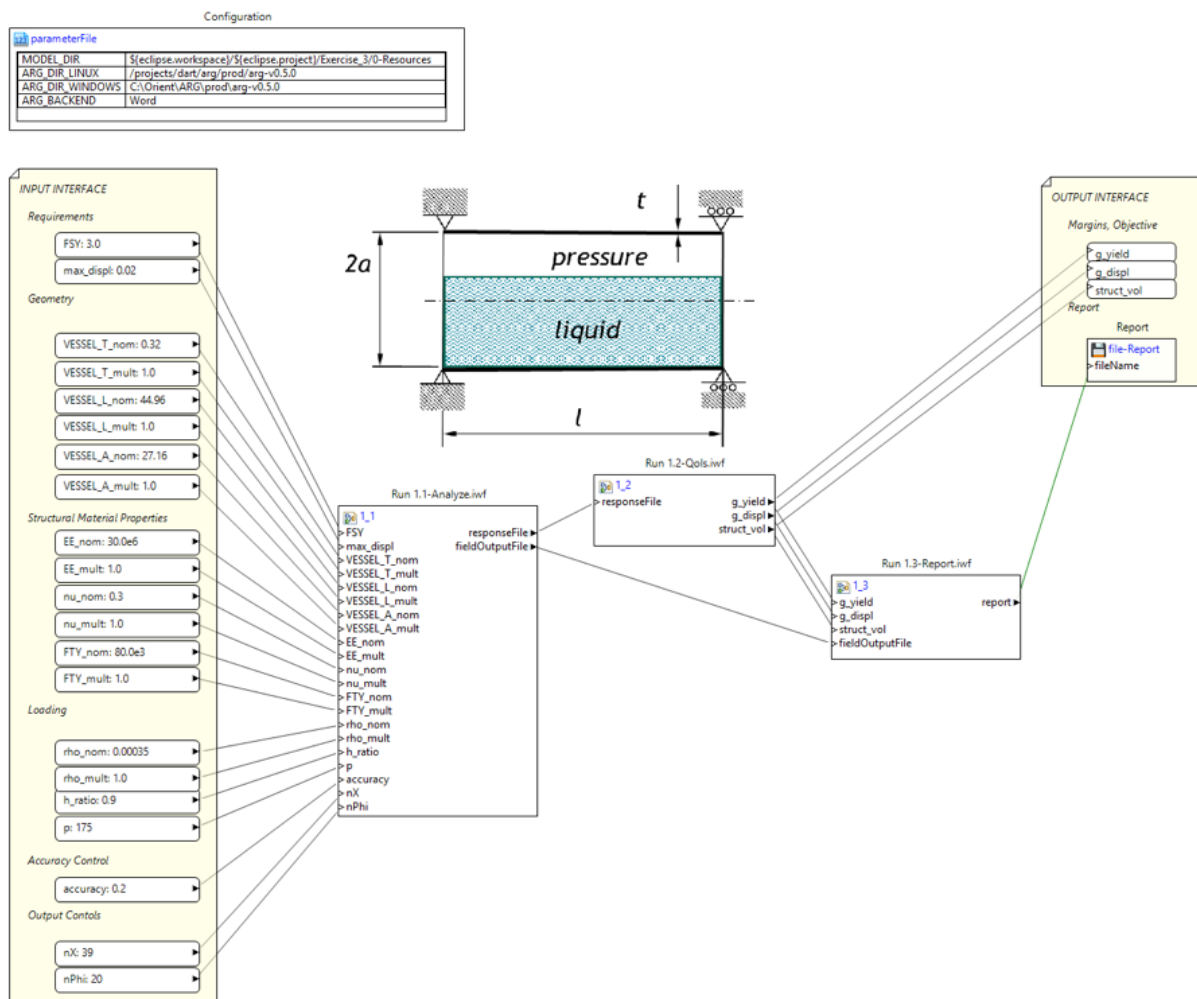


Figure 2.1: 1.0-Construct

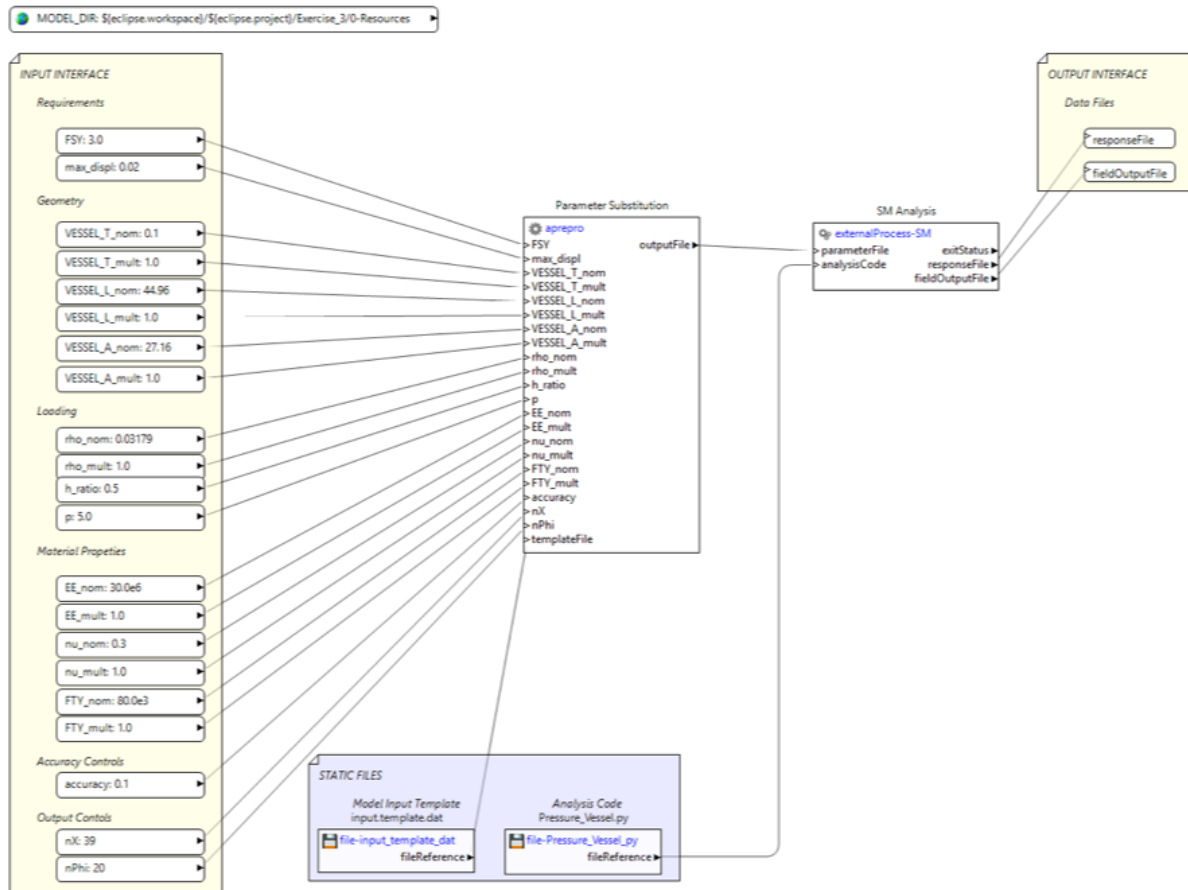


Figure 2.2: 1.1-Analyze

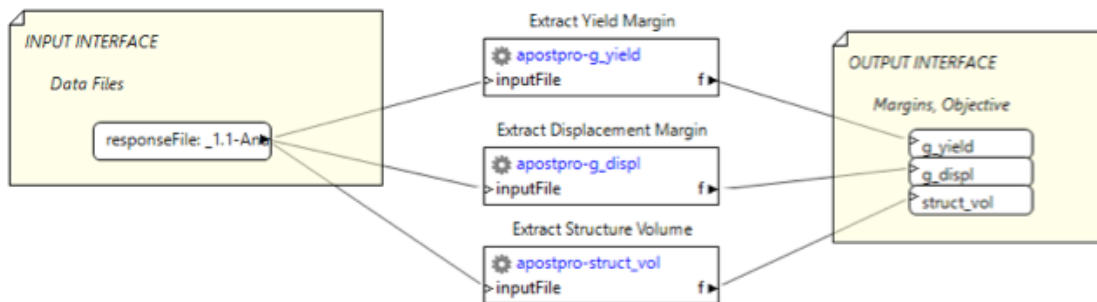


Figure 2.3: 1.2-QoIs

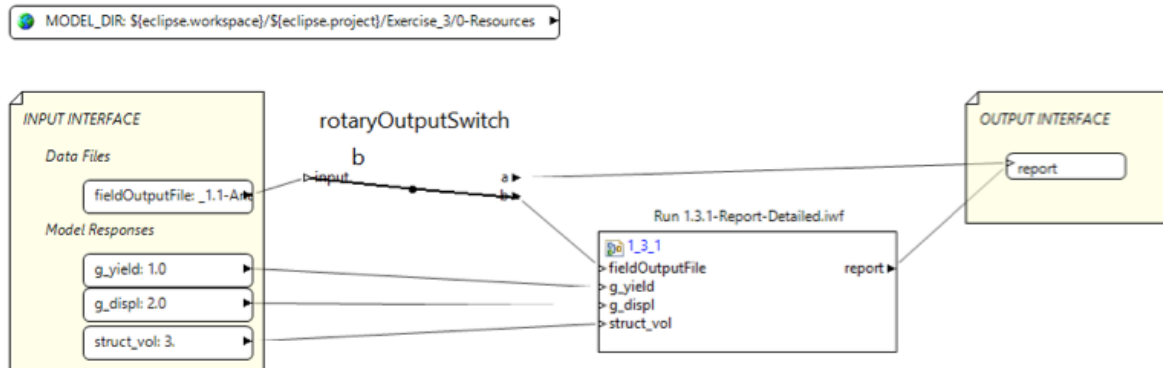


Figure 2.4: 1.3-Report

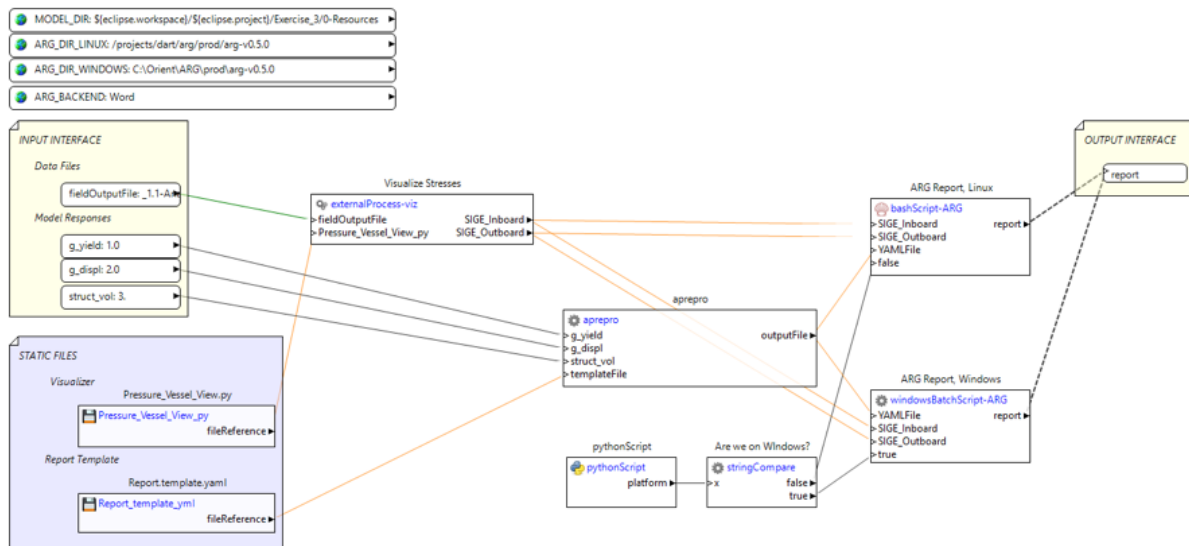


Figure 2.5: 1.3.1-Report-Detailed

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 5

Results – Sample 1

5.1 Model Parameters

key	value
accuracy	1.0000000000000000e-02
h_ratio	9.0000000000000000e-01
p	2.5000000000000000e+02
FSY	3.0000000000000000e+00
max_displ	2.0000000000000000e-02
VESSEL_L_nom	4.4500000000000000e+01
VESSEL_A_nom	2.5100000000000000e+01
VESSEL_T_nom	1.1000000000000000e+00
rho_nom	3.1790000000000000e-02
EE_nom	3.0000000000000000e+07
FTY_nom	8.0000000000000000e+04

Table 5.1: Values for `params.txt`.

5.2 Quantities of Interest

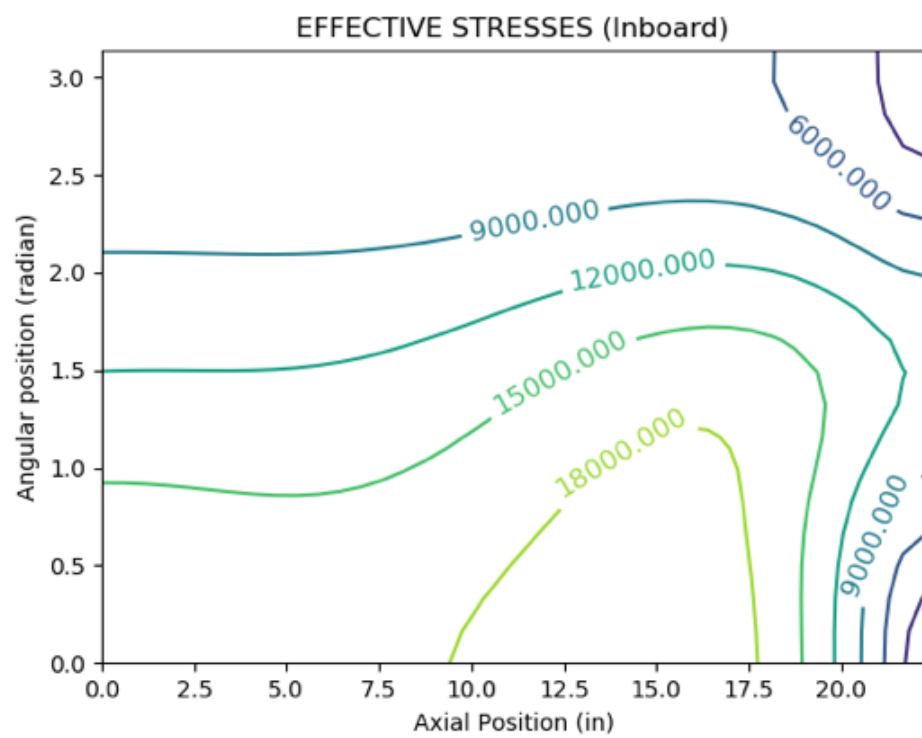


Figure 5.1: Sample 1 - Contour plot of the inboard von Mises stress (psi)

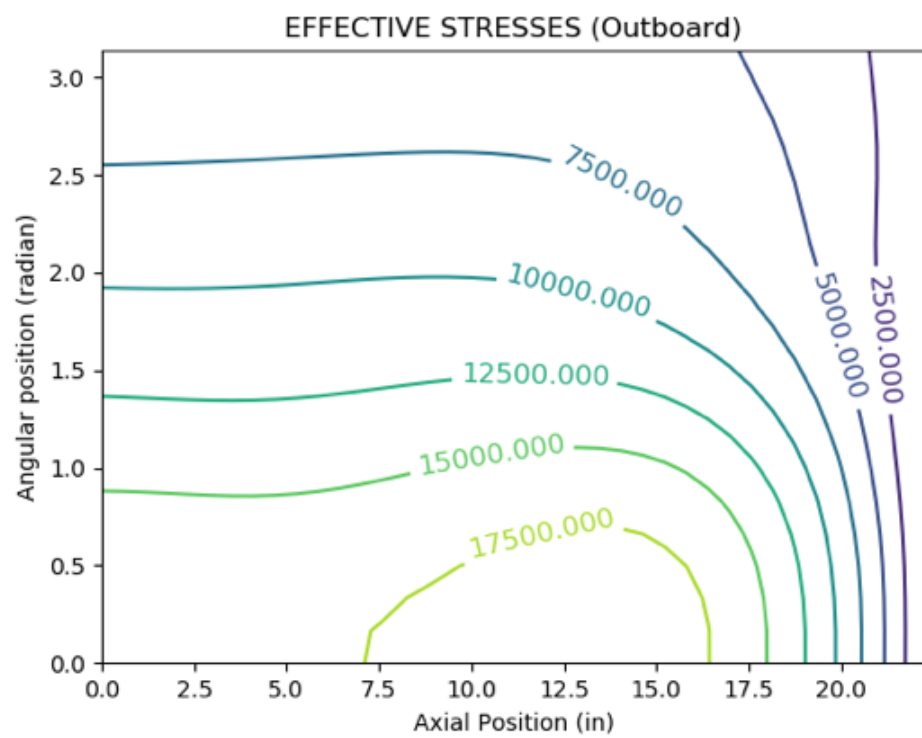


Figure 5.2: Sample 1 - Contour plot of the outboard von Mises stress (psi)

Chapter 6

Results – Sample 2

6.1 Model Parameters

key	value
accuracy	1.5000000000000000e-02
h_ratio	9.0000000000000000e-01
p	2.5000000000000000e+02
FSY	3.0000000000000000e+00
max_displ	2.0000000000000000e-02
VESSEL_L_nom	4.4500000000000000e+01
VESSEL_A_nom	2.5100000000000000e+01
VESSEL_T_nom	1.1000000000000000e+00
rho_nom	3.1790000000000000e-02
EE_nom	3.0000000000000000e+07
FTY_nom	8.0000000000000000e+04

Table 6.1: Values for `params.txt`.

6.2 Quantities of Interest

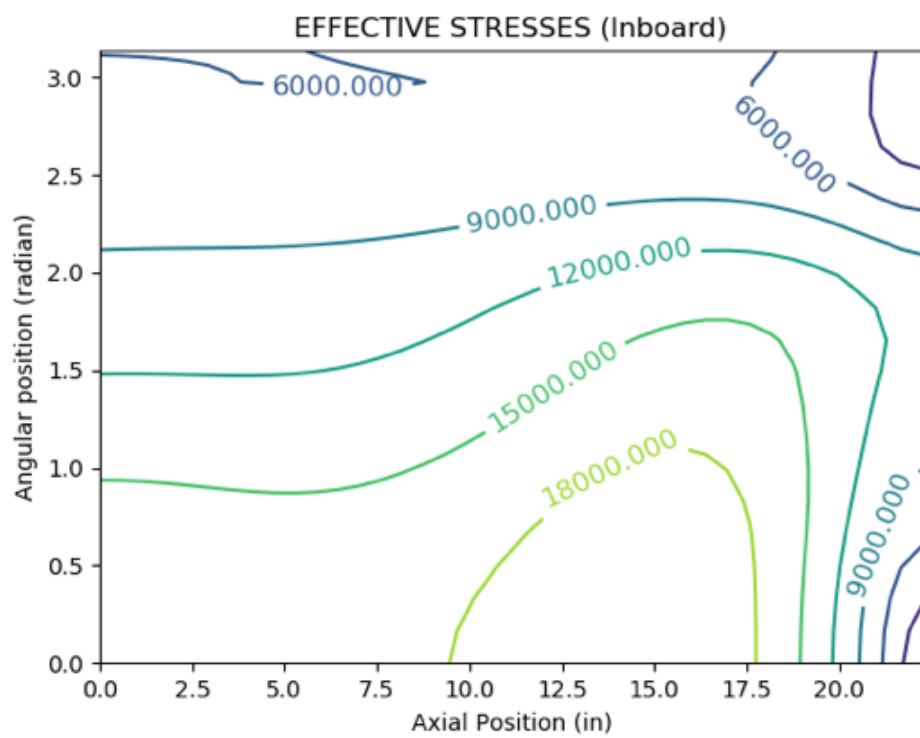


Figure 6.1: Sample 2 - Contour plot of the inboard von Mises stress (psi)

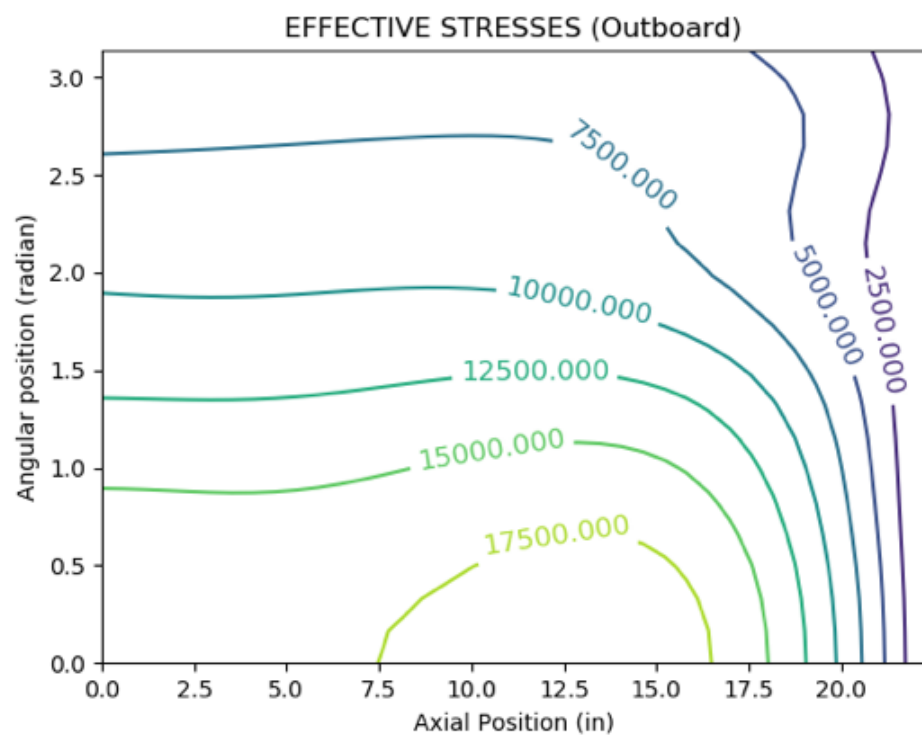


Figure 6.2: Sample 2 - Contour plot of the outboard von Mises stress (psi)

Chapter 7

Results – Sample 3

-
-
-

Chapter 8

Ensemble Results

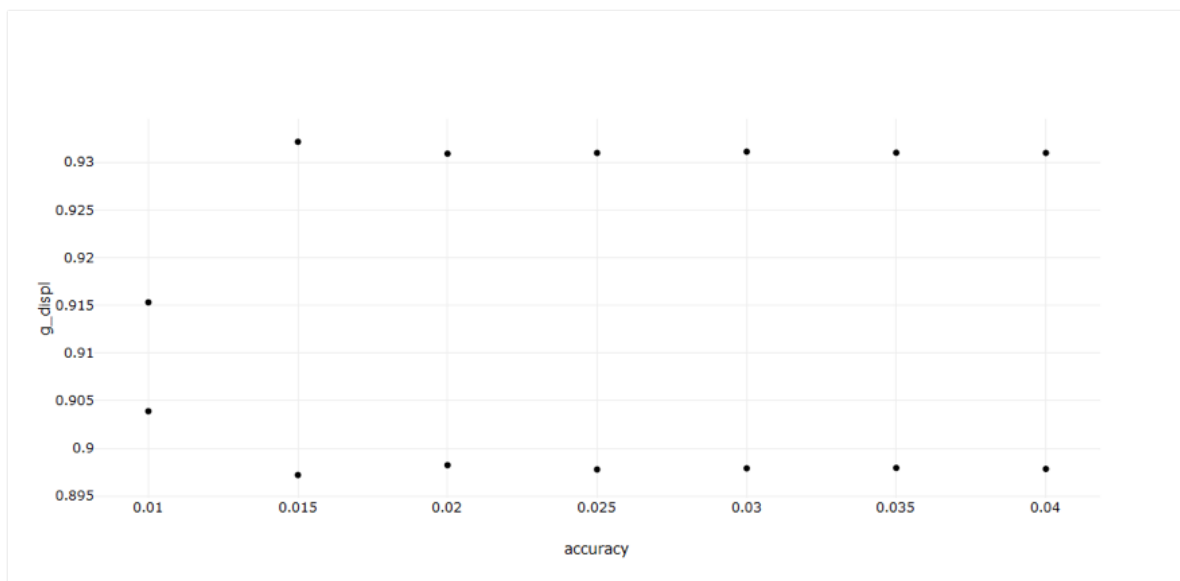


Figure 8.1: Displacement Margin Solution Verification

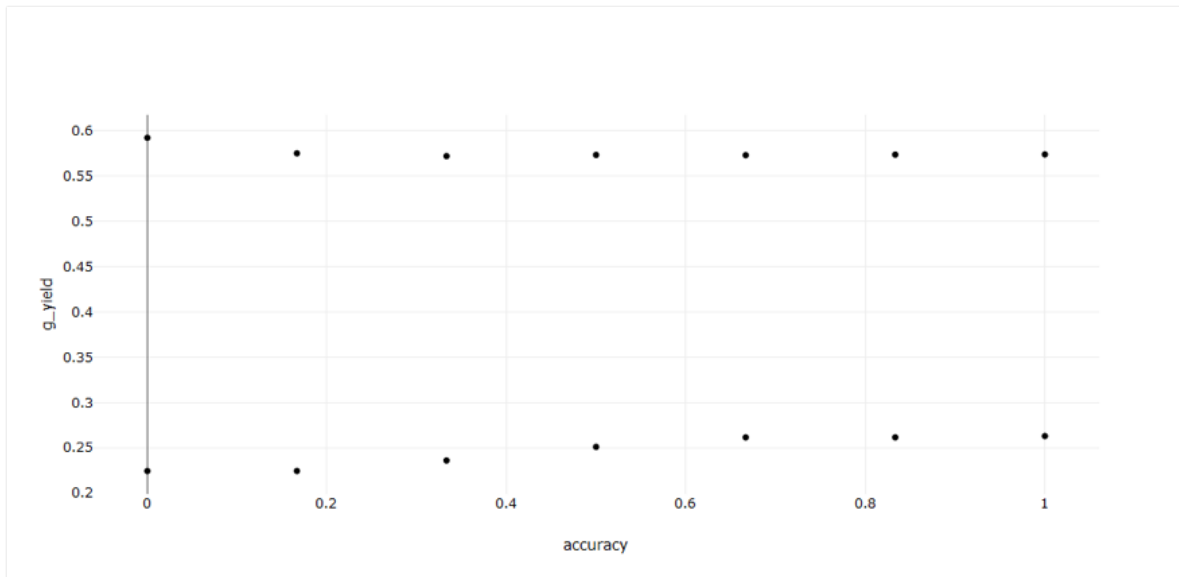


Figure 8.2: Stress Margin Solution Verification