Pressurized Vessel Stress Analysis Solution Verification Study  
root  
2021-04-15

**Abstract:**

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

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# 4. 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).

# 5. Analysis Workflow Structure

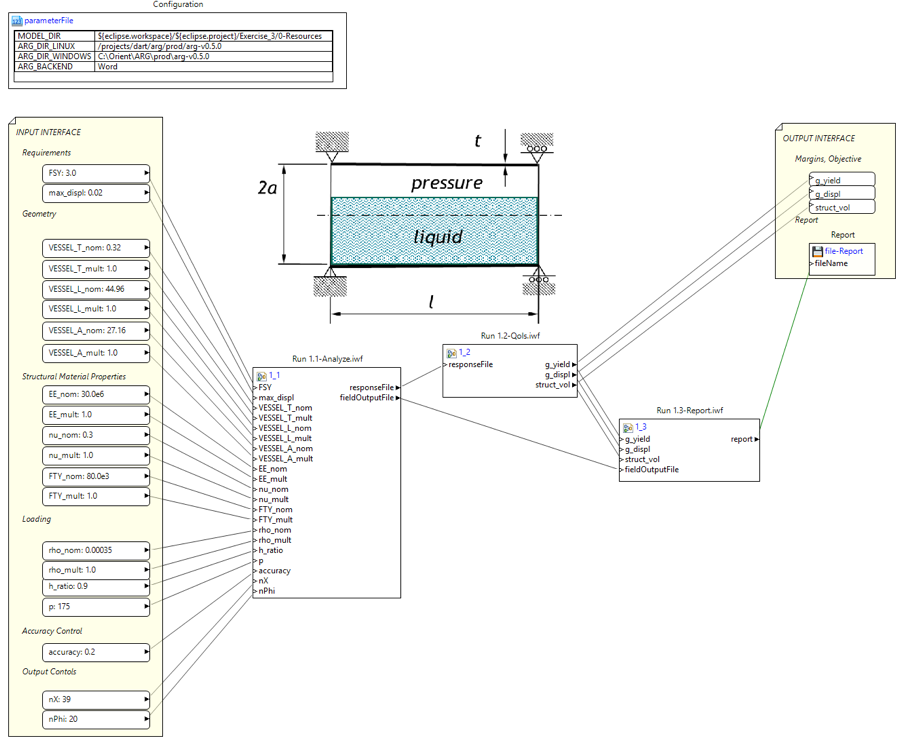


Figure : 1.0-Construct

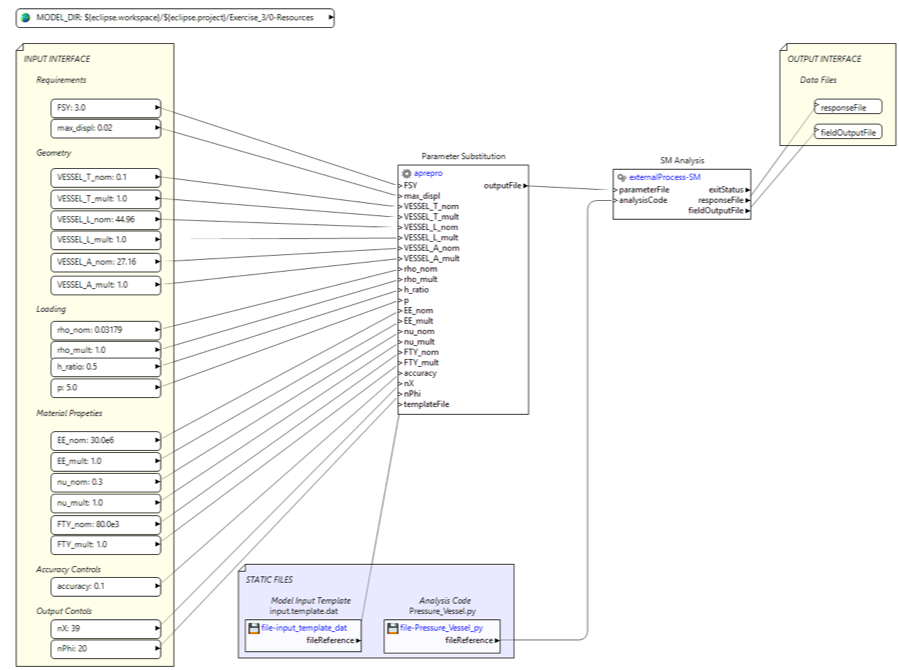


Figure : 1.1-Analyze

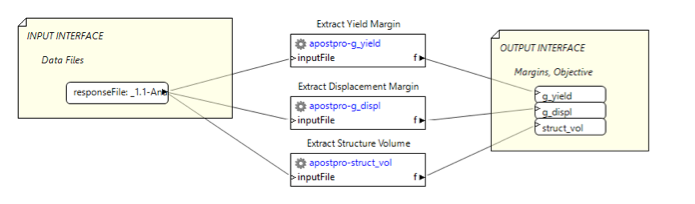


Figure : 1.2-QoIs

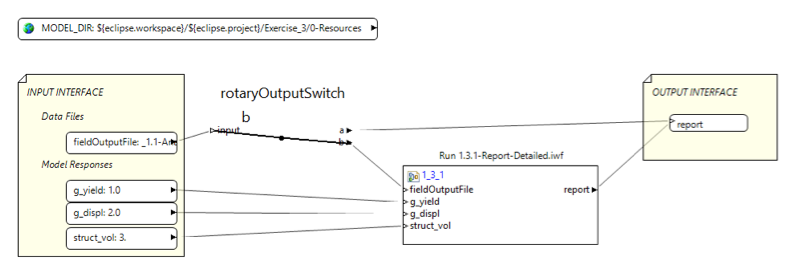


Figure : 1.3-Report

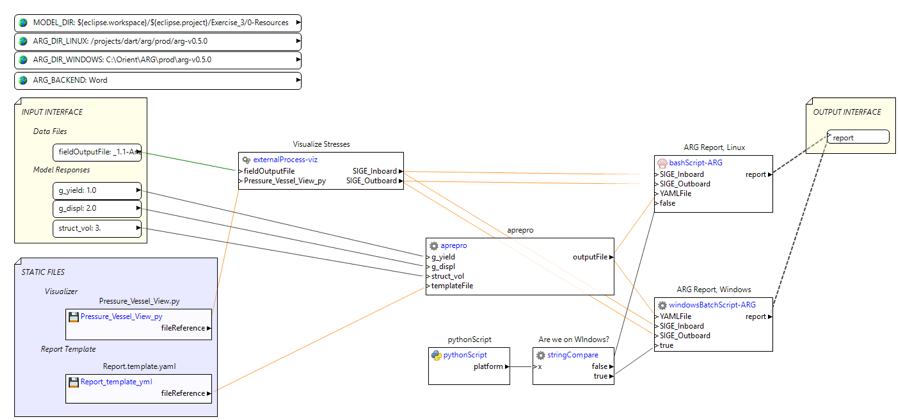


Figure : 1.3.1-Report-Detailed

# 6. Study Definition

List study with the following points:

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

Table : Meta-information of dakota\_results.h5

# 7. Study Workflow Structure

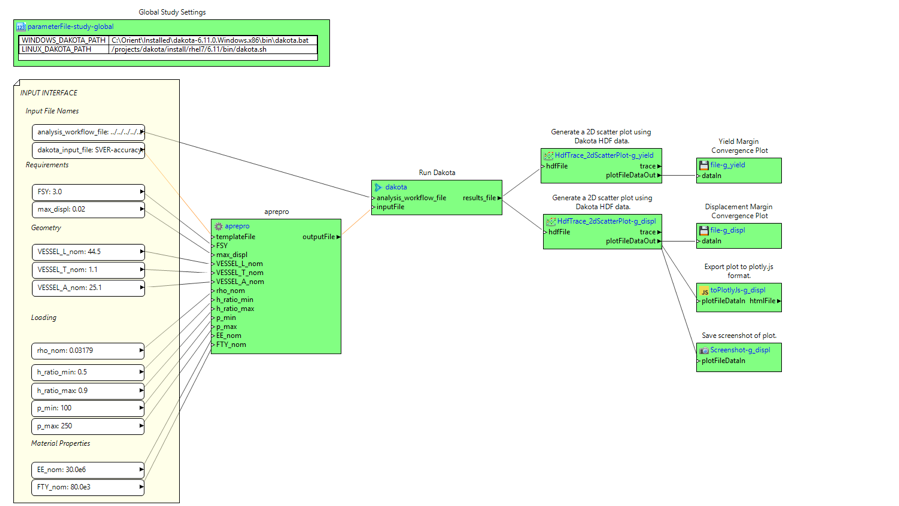


Figure : 100% Solution-Verification-Workflow

# 8. Results -- Sample 1

## 8.1. 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 : Values for params.txt.

## 8.2. Quantities of Interest

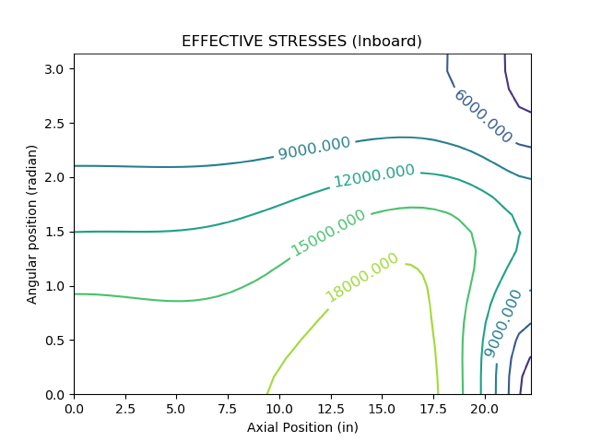


Figure : Sample 1 - Contour plot of the inboard von Mises stress (psi)

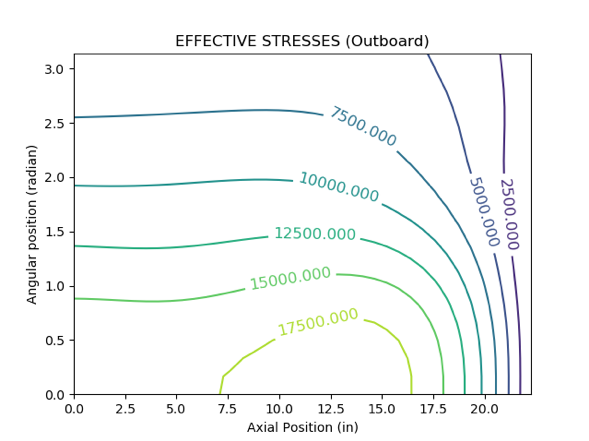


Figure : Sample 1 - Contour plot of the outboard von Mises stress (psi)

# 9. Results -- Sample 2

## 9.1. 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 : Values for params.txt.

## 9.2. Quantities of Interest

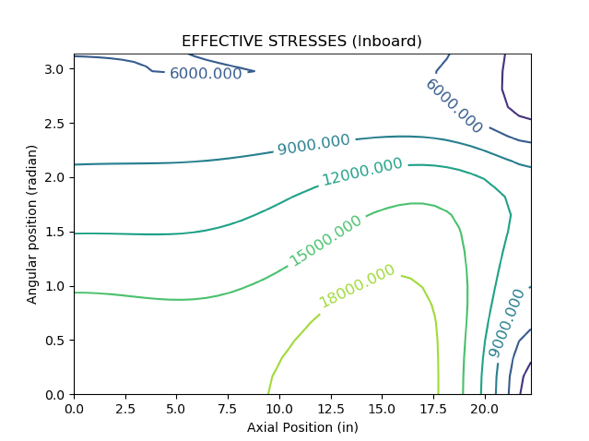


Figure : Sample 2 - Contour plot of the inboard von Mises stress (psi)

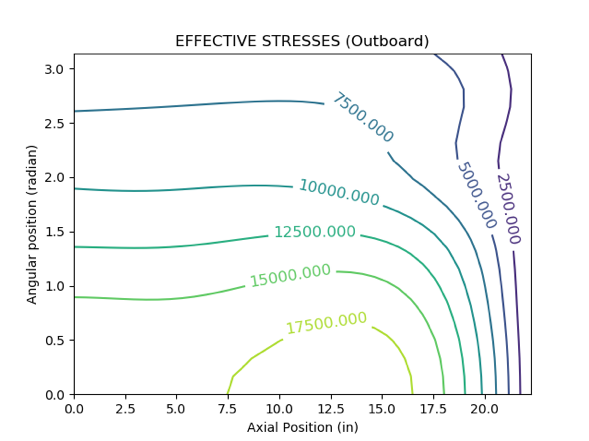


Figure : Sample 2 - Contour plot of the outboard von Mises stress (psi)

# 10. Results -- Sample 3

# 11. Ensemble Results

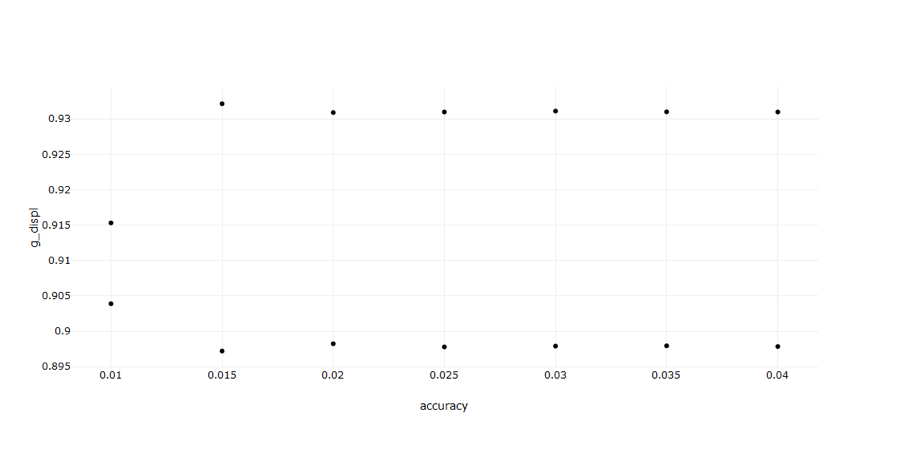


Figure : Displacement Margin Solution Verification

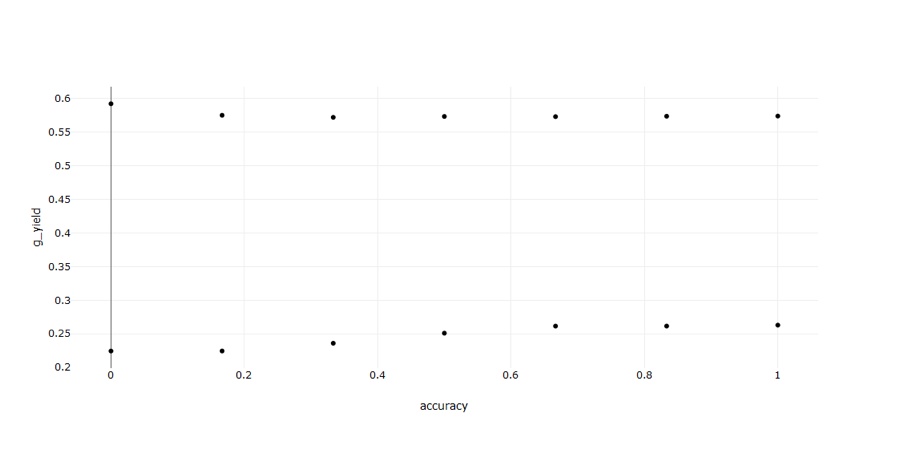


Figure : Stress Margin Solution Verification