

Disk Test Report

root

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Abstract

This report is about the numerical simulation of a heated disk spinning in air at ambient temperature.

It was generated using the Automatic Report Generator (ARG).

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Chapter 1

Introduction

The current implementation offers the ability to integrate text, VTK-generated visualizations, Matplotlib plots, and other artifacts, in a LaTeX or Word document. PyLaTeX and Python-docx are used to glue of all this together.

Chapter 2

The Spinning Heated Disk Case

2.1 Model Meta-Information

This section provides an overview of the data set used for this analysis.

item	number
Exodus II files	1
element blocks	1
elements	7472
node fields	7
node sets	3
nodes	8499
side sets	7

Table 2.1: Topological properties of `disk_out_ref.ex2`

block ID	block name
1	Unnamed block ID: 1

Table 2.2: Element blocks of `disk_out_ref.ex2`

node set ID	node set name
1	Unnamed set ID: 1
2	Unnamed set ID: 2
3	Unnamed set ID: 3

Table 2.3: Node sets of `disk_out_ref.ex2`

side set ID	side set name
1	Unnamed set ID: 1
2	Unnamed set ID: 2
3	Unnamed set ID: 3
4	Unnamed set ID: 4
5	Unnamed set ID: 5
6	Unnamed set ID: 6
7	Unnamed set ID: 7

Table 2.4: Side sets of `disk_out_ref.ex2`

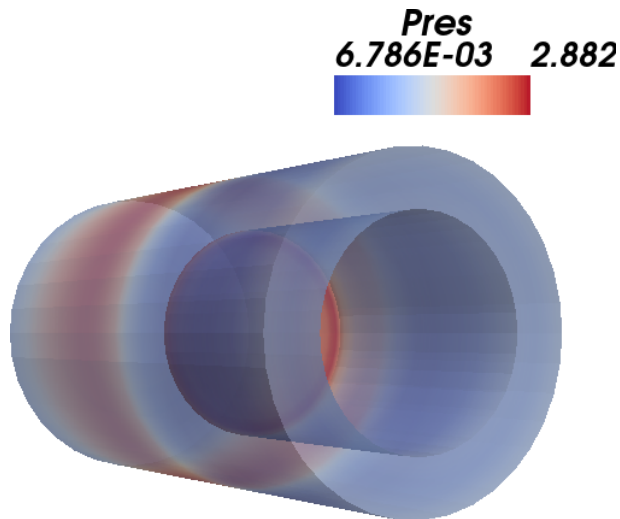
variable	type
AsH3	NODAL
CH4	NODAL
GaMe3	NODAL
H2	NODAL
Pres	NODAL
Temp	NODAL
V	NODAL

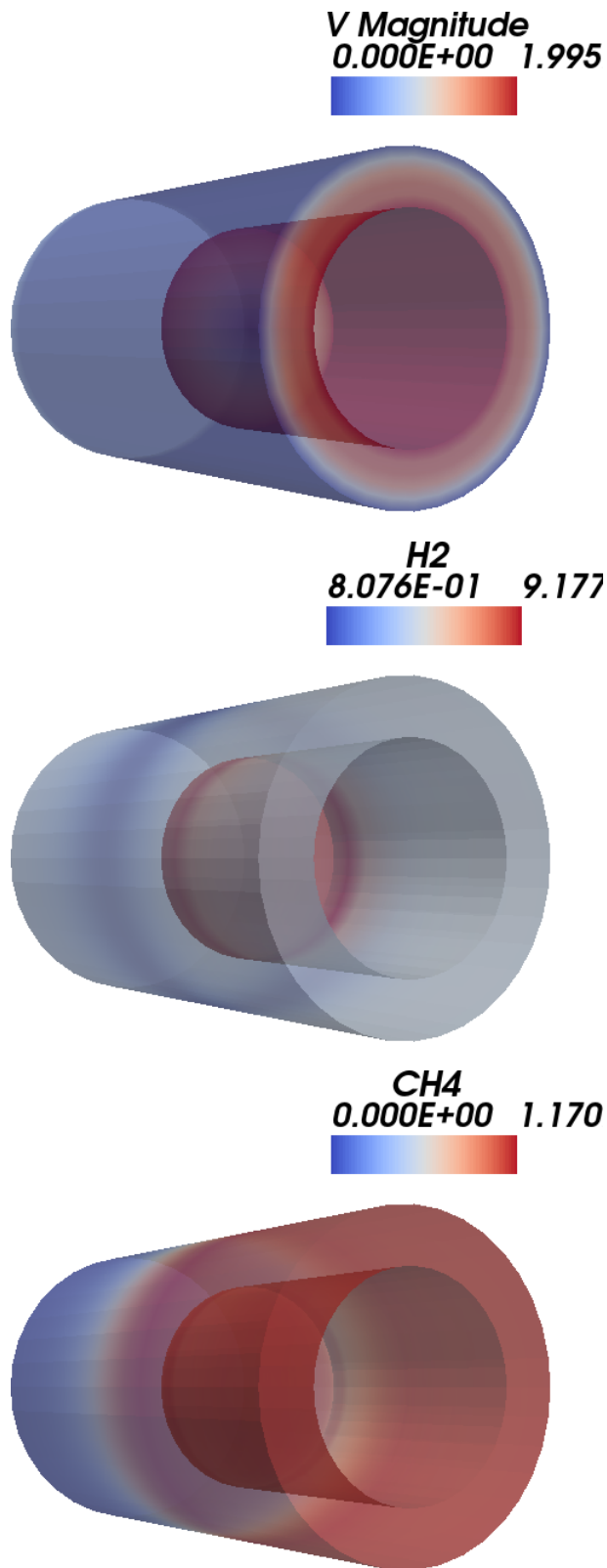
Table 2.5: Variables of `disk_out_ref.ex2`

2.2 Visualizations of Some Available Attributes

2.2.1 Surface Renderings

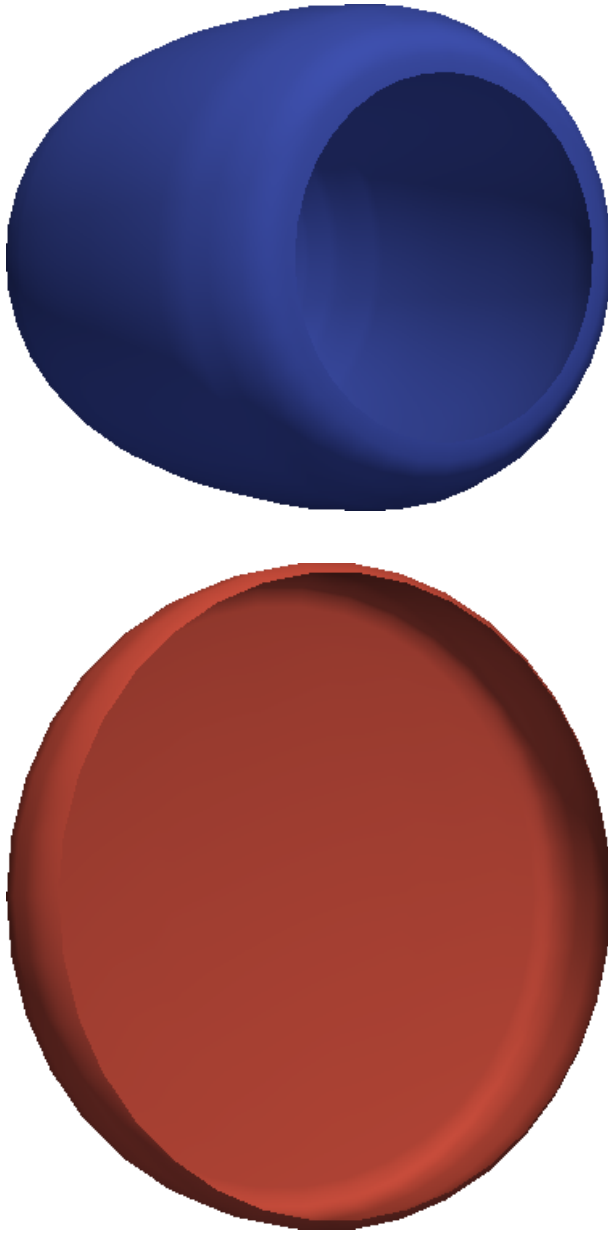
We begin by presenting some surface renderings of the data set for several of its scalar or vector attributes.





2.2.2 Isocontours

We now look at two different isocontours for the temperature values contained in this data set.



Note that, unlike surface renderings, isocontouring only makes sense for point-centered, scalar attributes. If the variable is cell-centered instead, it must be interpolated before iso-contours can be computed. As a result, interpolation errors will occur.

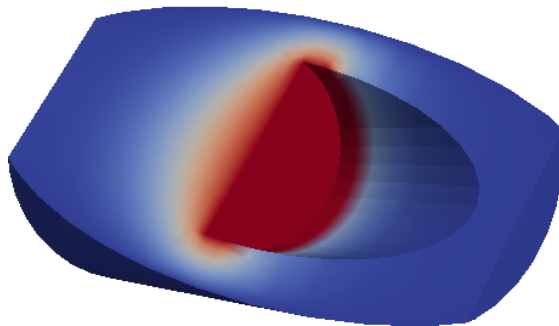
We chose two isocontour values that are close enough from the minimum and maximum values for that attribute, because we want to highlight: - the heated disk; - the cooler air mass surrounding it.

In a more refined implementation of this generator, we could specify a range of values so several contours can be shown in the same image.

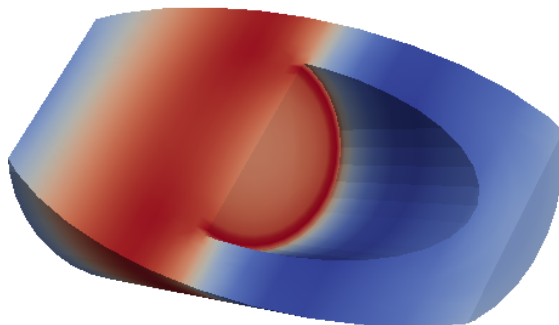
2.2.3 Clips

We finish by clipping the dataset with a plane, and surface rendering the result.

Temp
2.931E+02 9.132E+02



Pres
6.786E-03 2.882E-02



Chapter 3

Results

This chapter describes key results of the analysis workflow instance.

3.1 Quantities of Interest – Margin

3.1.1 Requirements

1. Tensile yield stress is 20000 psi
2. Required factor of safety is 3.

3.1.2 Calculated Performance

- The calculated maximum nodal projected Mises stress is 7904.79 psi.
- The calculated normalized margin of maximum von Mises stress is -0.062.