

Origami Analysis Interface Module (AIM)

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1 Introduction

1.1 Origami AIM Overview

A module in the Computational Aircraft Prototype Syntheses (CAPS) has been developed to interact (primarily through input files) with the finite element structural solver Origami **[Origami]**.

Current issues include:

- A thorough bug testing needs to be undertaken.

An outline of the AIM's inputs, outputs and attributes are provided in [AIM Inputs](#) and [AIM Outputs](#) and [Origami AIM attributes](#), respectively.

The accepted and expected geometric representation and analysis intentions are detailed in [Geometry Representation and Analysis Intent](#).

Details of the AIM's shareable data structures are outlined in [AIM Shareable Data](#) if connecting this AIM to other AIMS in a parent-child like manner.

Details of the AIM's automated data transfer capabilities are outlined in `dataTransferOrigami`

1.2 Examples

Example problems using the Origami AIM may be found at `examplesOrigami` .

2 Origami AIM attributes

The following list of attributes are required for the Origami AIM inside the geometry input.

- **capsIntent** This attribute is a CAPS requirement to indicate the analysis intention the geometry representation supports. Options are: ALL, STRUCTURE

- **capsGroup** This is a name assigned to any geometric body. This body could be a solid, surface, face, wire, edge or node. Recall that a string in ESP starts with a \$. For example, attribute `capsGroup $Wing`.

3 Geometry Representation and Analysis Intent

The attribute `capsIntent` may be set to either ALL or STRUCTURE for the Origami AIM. The geometric representation for the AIM requires that bodies be:

- FACEBODY or SHEETBODY (non-manifold)

4 AIM Inputs

The following list outlines the Origami inputs along with their default value available through the AIM interface. Unless noted these values will be not be linked to any parent AIMs with variables of the same name.

- **Proj_Name = "origami_CAPS"**
This corresponds to the project name used for file naming.
- **Property = NULL**
NOT USED currently, Property tuple used to input property information for the model, see `feaProperty` for additional details.
- **Material = NULL**
NOT USED currently, Material tuple used to input material information for the model, see `feaMaterial` for additional details.
- **Constraint = NULL**
NOT USED currently, Constraint tuple used to input constraint information for the model, see `feaConstraint` for additional details.
- **Load = NULL**
NOT USED currently, Load tuple used to input load information for the model, see `feaLoad` for additional details.
- **Radius = 0.025**
Radius of sphere at nodal points.
- **Radius_Ratio = 0.75**
Ratio between radii of spheres and rods [$0 < \text{Radius_Ratio} \leq 1$].
- **Thickness_Ratio = 0.75**
Ratio between radii of spheres and the thickness of the plate [$0 < \text{Thickness_Ratio} \leq 2$]. In general it should be less than $2 * \text{Radius_Ratio}$.
- **Connection_Type = 1**
Connection type between elastomer and plates. 1 = Subtract plate from (unconnected) elastomer.
- **Scale_Factor = 1.0**
Scale the output geometry.
- **Elastomer_End_Ratio = 2**
Ratio between radii of spheres and the offset to move the elastomer end points (`Connection_Type == 1`).

5 AIM Shareable Data

Currently the Origami AIM does not have any shareable data types or values and does not try to inherit anything.

6 AIM Outputs

The following list outlines the Origami outputs available through the AIM interface.

7 aimOutputsAVL

- **DeformShape** = Reads in a deformed shaped (*.origami_deform), add thickness to it (see [AIM Inputs](#)) in the z-direction and write out a *.stl file of the deformed 3D shape.

