

# Spacecraft Visualization Properties

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## Explore

## Known Bugs

I did a bug search in JIRA by selecting Spacecraft Visualization (FRR-5 under components and found following P1 and P2 open bugs/issues for FRR-5 feature:

- [GMT-2841 Spacecraft Model Turns White, initially looks good](#)
- [GMT-2683 Error with scale slider in Visualization tab](#)

## Failing Tests

There are no tests that are failing in the nightly regression reports related to FRR-5 Spacecraft Visualization.

## Other Findings

**Issue 1:** I tried to load different spacecraft models and models that have texture maps are not being fully wrapped on the spacecraft model. As an example, I uploaded Hubble Space Telescope (HST) model that has texture maps and texture maps were not fully mapped onto HST's spacecraft model. The appearance of texture maps onto the S/C model seems to be random. When you upload S/C model in multiple independent GMAT sessions, then appearance of texture maps varies from one GMAT session to another. **GMT-2841** was already created in the JIRA but I added my own observations onto it as well.

**Recommendation:** Fix (Fix by: R2013a, Priority: P1 **GMT-2841** is already created in JIRA that addresses this issue.

**Issue 2:** When you upload POV models into GMAT, POV models upload just fine but we cannot see the 3D model into S/C visualization properties' 'Display' window and cannot see it in OrbitView window as well. I created a bug for it called **GMT- 3303**. Please see GMT-3303 in JIRA for more details.

**Recommendation:** Fix (Fix by: R2013a, Priority: P2 . GMT-3303 has been created in JIRA.

## Requirements

Accepted by CCB 30 Oct 2013. (Deferred POV file)

FRR-5.1.0	The system shall allow the user to define a spacecraft model using the following model formats:
FRR-5.1.1	1) 3DS
Deferred	2) POV
FRR-5.2	The system shall allow the user to translate the coordinates used on the file to adjust the offset in the X, Y, and Z directions.
FRR-5.3	The system shall allow the user to apply a fixed rotation to the attitude orientation used on the file to adjust the model orientation.
FRR-5.4	The system shall allow the user to apply a scale factor to the model size on the file and the scale factor will be used in the Orbit View display.
FRR-5.5	The system shall allow the user to specify different orbit color of all spacecraft trajectories plotted in 3-D graphics.
FRR-5.6	The system shall allow the user to be able to select different colors for perturbing trajectories during iterative processes like differential correction or optimization.

# Interface/Functional Spec

## Overview

The visual properties of the spacecraft

## Description

The spacecraft visualization properties lets you define a spacecraft model, translate the spacecraft in X,Y, Z directions or apply a fixed rotation to the attitude orientation of the model. You can also adjust the scale factor of the spacecraft model size. GMAT lets you set orbit colors via the spacecraft visualization properties as well. You can set colors to spacecraft orbital trajectories and any perturbing trajectories that are drawn during iterative processes. See [Setting Colors](#) documentation for discussion and examples on how to set orbital colors using Spacecraft object's OrbitColor and TargetColor fields. Also see the Fields section below to read more about these two fields. The Spacecraft visualization properties can be configured either through GMAT's GUI or the script interface.

See Also: [OrbitView](#) and [Setting Colors](#).

## Fields

See the [User Interface Spec](#) spreadsheet for reference information for fields.

## GUI

The figure below shows the default settings for the Spacecraft Visualization properties resource:

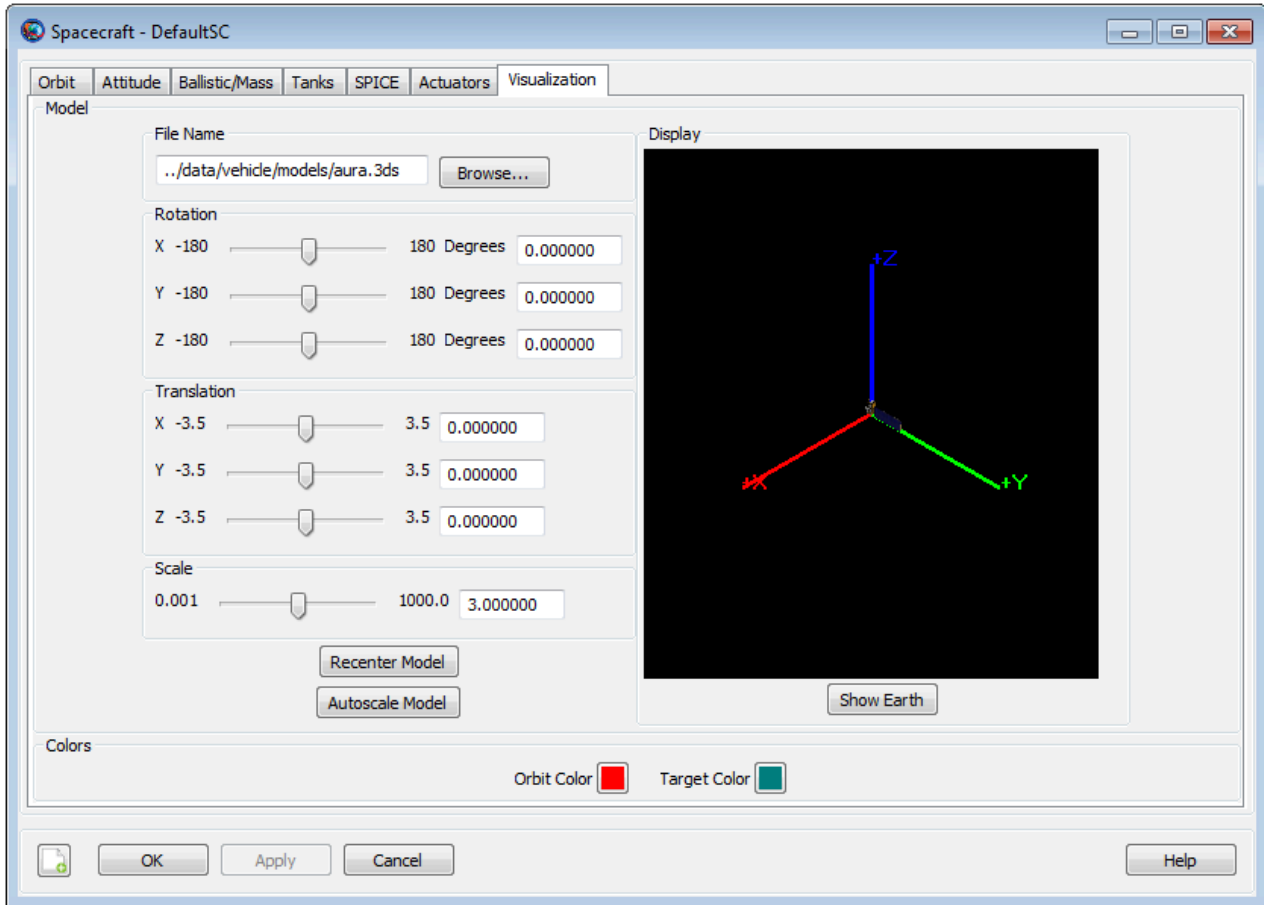


Figure: Default Name and Settings for the Spacecraft Visualization Object Dialog Box

The GUI interface for spacecraft visualization properties is contained on the Visualization tab of the Spacecraft resource. You can configure visualization properties of the spacecraft and visualize the changes in the Display window.

Within the Display window, you can left click and drag your mouse to change camera orientation. Camera orientation can be changed in Up/Down/Left/Right directions. You can also right click and drag your mouse to zoom in and out of the Display window. Moving the cursor in Left/Right or Up/Down directions helps to zoom in and out of the Display window.

# Remarks

## Configuring Spacecraft Visualization properties

GMAT lets you define any spacecraft model but currently GMAT supports only .3ds model formats. The following two websites list many .3ds spacecraft model formats. Most of these models are in .3ds format, which can be read by most 3D programs.

[http://www.nasa.gov/multimedia/3d\\_resources/models.html](http://www.nasa.gov/multimedia/3d_resources/models.html) & <http://www.celestiamotherlode.net/>

GMAT lets you apply fixed rotation to the attitude orientation of the spacecraft model or translate the model in any of the X, Y and Z directions. You can also apply a scale factor to the selected spacecraft model to adjust the size of the model. Any changes that are made to the spacecraft model, attitude orientation, translation or scale size factor will also be displayed in OrbitView resource's graphics window. The configured spacecraft visualization properties will only show up in OrbitView graphics window after you have run the mission. See OrbitView resource's user-specification document to learn more about OrbitView graphics window.

## Examples

This example shows you how to configure Spacecraft Visualization properties. All values are non-default values.

```
Create Spacecraft aSat;
GMAT aSat.ModelFile = '../data/vehicle/models/aura.3ds';
GMAT aSat.ModelOffsetX = 1.5;
GMAT aSat.ModelOffsetY = -2;
GMAT aSat.ModelOffsetZ = 3;
GMAT aSat.ModelRotationX = 180;
GMAT aSat.ModelRotationY = 180;
GMAT aSat.ModelRotationZ = 90;
GMAT aSat.ModelScale = 15;

Create Propagator aProp;

Create OrbitView aOrbitView;
GMAT aOrbitView.Add = {aSat, Earth};

BeginMissionSequence;
Propagate aProp(aSat) {aSat.ElapsedSecs = 9000};
```

# Test Procedures

## Assumptions

- All tests use both default and non-default values

## File Naming Conventions

The goal of the naming convention is to allow people to intuitively understand the purpose of the test by the name of the test file. The file naming conventions in this section are guidelines to be used when they “make sense” and are to be modified when they don’t “make sense”. They’re not strict rules.

Spacecraft Visualization Properties uses the following format for nominal tests:

Spacecraft\_Visualization\_Properties<*description of test*>

Use the following format for validation tests:

Spacecraft\_Validation\_<Field>\_ <*description of test*>

## Nominal Tests

Priority	Status	Summary
P1	Done RHQ	Test whether the system allows the user to define a spacecraft model using the 3DS model format
PI	Done RHQ.	Test whether the system allows the user to define a spacecraft model using the POV model format

	<p>Created GMT-3303. POV formats do not show up Graphics windows when you upload them.</p>	
P1	<p>Done RHQ</p>	<p>Test whether the system allows the user to add a translate to the coordinates used on the file to adjust the offset in the + or - X directions.</p>
P1	<p>Done RHQ</p>	<p>Test whether the system allows the user to add a translate to the coordinates used on the file to adjust the offset in the + or - Y directions.</p>
P1	<p>Done RHQ</p>	<p>Test whether the system allows the user to add a translate to the coordinates used on the file to adjust the offset in the + or - Z directions.</p>
P1	<p>Done RHQ</p>	<p>Test whether the system allows the user to apply a fixed rotation to the attitude orientation to adjust the model orientation about X axis</p>
P1	<p>Done RHQ</p>	<p>Test whether the system allows the user to apply a fixed rotation to the attitude orientation to adjust the model orientation about Y axis</p>
P1	<p>Done RHQ</p>	<p>Test whether the system allows the user to apply a fixed rotation to the attitude orientation to adjust the model orientation about Z axis</p>
P1	<p>Done RHQ</p>	<p>Test whether the system allows you to to apply a scale factor to the model size and check whether scale factor is displayed in the Orbit View display.</p>

## Edge/Corner/Miscellaneous Tests

I cannot think of any as of yet.

Priority	Status	Summary

## Unique Validation Tests

These are unique validation tests that are required for special field or object couplings for this Spacecraft Visualization Properties feature.

Priority	Status	Summary
P1	SPH Done	Test range constraints on ModelOffsetX field
P1	SPH Done	Test range constraints on ModelOffsetY field
P1	SPH Done	Test range constraints on ModelOffsetZ field
P1	SPH Done	Test range constraints on ModelRotationX field
P1	SPH	Test range constraints on ModelRotationY field



## Unique GUI Tests

These are tests that are unique to the GUI interface for this feature that are not covered by the standard GUI test template and procedures.

Priority	Status	Summary
P1	Done. RHQ	Wrote scripts to test spacecraft visualization OrbitColor and TargetColor fields for 75 colors and sent them to GUI Tester to create GUI Regression tests
P1	Done RHQ	Wrote scripts to test spacecraft visualization OrbitColor and TargetColor fields in CommandMode and sent them to GUI Tester to create GUI Regression tests