

FRR-36 MatlabFunction

Feature Spec and Test Procedures

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[Explore](#)

[Known Bugs](#)

[Failing Tests](#)

[Other Findings](#)

[Requirements](#)

[FRR-36 \(new\)](#)

[Interface/Functional Spec](#)

[Overview](#)

[Description](#)

[Fields](#)

[GUI](#)

[Remarks](#)

[Search Path](#)

[Examples](#)

[Test Procedures](#)

[Assumptions](#)

[Existing Tests](#)

[Recommended Additional Tests](#)

[Nominal Tests](#)

[Edge/Corner/Stress](#)

[Unique Validation](#)

[Unique Mode Tests](#)

[Unique GUI Tests](#)

Explore

Known Bugs

| JIRA ID | Summary | Rec. |
|---------|---------|------|
|---------|---------|------|

| | | |
|--------------------------|---|-----------------------|
| GMT-161 | Common Tasks: Calling MATLAB Functions: Calling a MATLAB Function | P1. Joel will fix. |
| GMT-1098 | Tab key navigation fails | Appears fixed |
| GMT-1106 | Filename extension and Matlab path checks | Appears fixed |
| GMT-2315 | Relative GMAT_FUNCTION_PATH paths don't work on Windows | Verify |
| GMT-2425 | GMAT does not perform any pre-run-script checks when adding a Matlab function | Duplicate of GMT-1106 |
| GMT-2906 | Incorrect usage of relative paths when setting GmatFunction.FunctionPath | Needs tests |
| GMT-3034 | Cannot create MatlabFunction with same name as an existing .gmf file | P1 |
| GMT-3106 | Make GMAT Functions a plugin | P1 |

Failing Tests

There are no failing tests as of 2011-11-15.

Other Findings

| JIRA ID | Summary | Rec. |
|--|---|------|
| GMT-3321 , GMT-3322 | MATLAB functions sometimes use stale data or path information if the window isn't closed between runs (edit matlab function and rerun, change FunctionPath and rerun) | P1 |

Requirements

FRR-36 (new)

| ID | Requirement |
|----------|---|
| FRR-36.1 | The system shall allow the user to declare a name as the name of an external function in the MATLAB language. |
| FRR-36.2 | The system shall allow the user to specify a path to search for the declared function. |

Interface/Functional Spec

Overview

Declaration of an external MATLAB function

Description

The **MatlabFunction** resource declares to GMAT that the name given refers to an existing external function in the MATLAB language. This function can be called in the Mission Sequence like a built-in function, with some limitations. See the [MATLAB Function Call](#) reference for details. Both user-created functions and built-in functions (like cos or path) are supported.

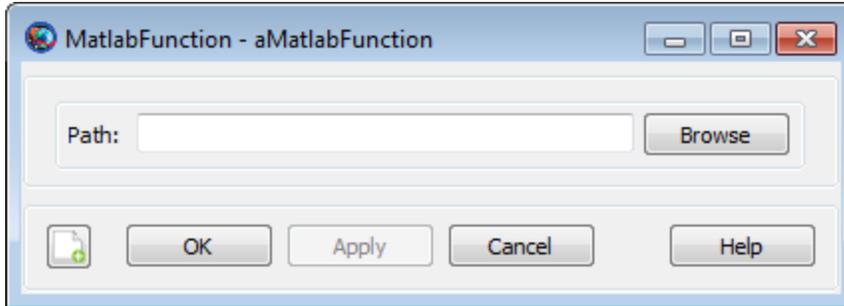
GMAT supports passing data to and from MATLAB through the function. It requires that a supported and properly configured version of MATLAB exist on the system.

See Also: [MATLAB Function Call](#), [MATLAB Interface](#)

Fields

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

GUI



The **MatlabFunction** GUI window is very simple; it has a single file input box for the function path, and a **Browse** button that lets you graphically select the path.

Remarks

Search Path

When a function declared as a **MatlabFunction** is called, GMAT starts MATLAB in the background with a custom, configurable search path. MATLAB then searches for the named function in this search path. The search is case-sensitive, so the name of the function name and the **MatlabFunction** resource must be identical.

The search path consists of the following components, in order:

1. **FunctionPath** field of the associated **MatlabFunction** resource (default: empty)
2. MATLAB_FUNCTION_PATH entries in the GMAT startup file (default: `<GMAT>\userfunctions\matlab`)
3. MATLAB search path (returned by the MATLAB `path()` function)

If multiple MATLAB functions are called within a run, the **FunctionPath** fields for each are prepended to the search path at the time of the function call.

Multiple paths can be combined in the **FunctionPath** field by separating the paths with a semicolon (on Windows) or a colon (on Mac OS X and Linux).

Working Directory

When MATLAB starts in the background, its working directory is set to the GMAT `bin` directory.

Examples

Call a simple built-in MATLAB function:

```
Create MatlabFunction sinh
Create Variable x y
```

```
BeginMissionSequence
```

```
x = 1
[y] = sinh(x)
```

Call an external custom MATLAB function:

```
Create Spacecraft aSat
Create ImpulsiveBurn aBurn
Create Propagator aProp

Create MatlabFunction CalcHohmann
CalcHohmann.FunctionPath = 'C:\path\to\functions'
```

```
Create Variable a_target mu dv1 dv2
mu = 398600.4415
```

```
BeginMissionSequence
```

```
% calculate burns for circular Hohmann transfer
[dv1, dv2] = CalcHohmann(aSat.SMA, a_target, mu)
```

```
% perform first maneuver
aBurn.Element1 = dv1
Maneuver aBurn(aSat)
```

```
% propagate to apoapsis
Propagate aProp(aSat) {aSat.Apoapsis}
```

```
% perform second burn
aBurn.Element1 = dv2
Maneuver aBurn(aSat)
```

Return the MATLAB search path and working directory:

```
Create MatlabFunction path pwd
Create String pathStr pwdStr
Create ReportFile aReport
```

```
BeginMissionSequence
```

```
[pathStr] = path
```

```
[pwdStr] = pwd
```

```
Report aReport pathStr
```

```
Report aReport pwdStr
```

Test Procedures

Assumptions

(None)

Existing Tests

(None)

Recommended Additional Tests

Nominal Tests

All test names begin with the prefix "MatlabFunction_".

| Status | Name | Summary |
|-------------------|----------|---|
| ✓ | Builtin | Declare and call MATLAB built-in function |
| ✓ | Custom | Declare and call custom function |
| ✓ (2012-11-20) | (Manual) | Declare and call custom function with specified absolute path |
| ✓ | Relative | Declare and call custom function with specified relative path |
| ✓ (2012-11-20) | (Manual) | Path variations in startup file |

Edge/Corner/Stress

All test names begin with the prefix "MatlabFunction_".

| Status | Name | Summary |
|--------|--|---|
| ✓ | Custom_magic | Declare and call custom function with same name as MATLAB built-in function |
| ✓ | Custom_DegToRad, Custom_DegToRad_Assignme nt | Declare and call custom function with same name as GMAT built-in function |

Unique Validation

All test names begin with the prefix "MatlabFunction_Validation".

| Status | Name | Summary |
|--------|-----------------|--------------------------------|
| ✓ | Function Path_* | Invalid function path |
| ✓ | Function Type_* | Run the wrong type of function |

Unique Mode Tests

| Status | Name | Summary |
|--------|------|---------|
| | | |
| | | |
| | | |

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.

| Status | Name | Summary |
|--------|------|---------|
| | | |
| | | |
| | | |