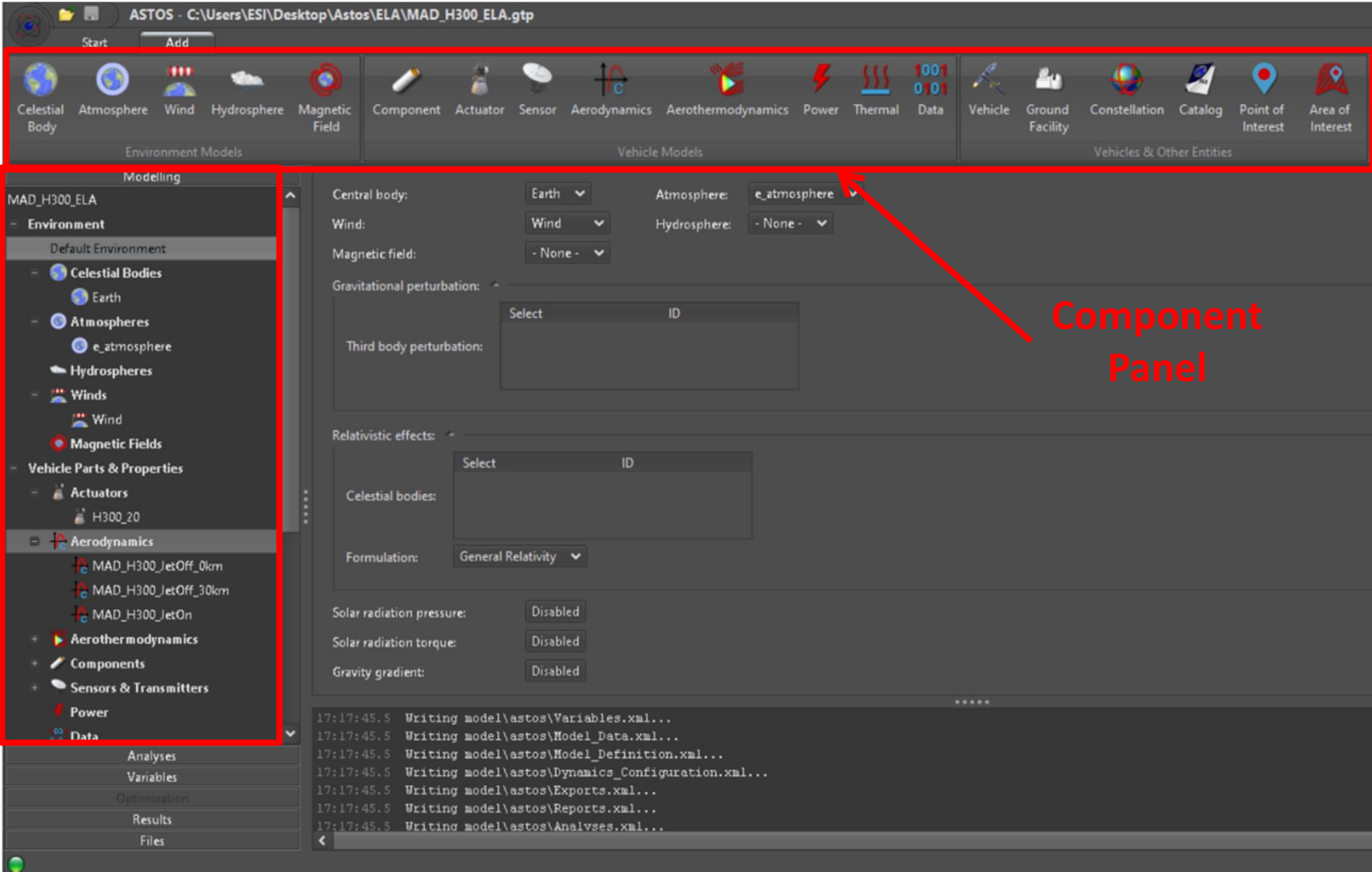




ASTOS UI Overview – Sub-Orbital Rocket Trajectory Modelling

Jason Ong



UI Tree

Component Panel



ASTOS - C:\Users\ESI\Desktop\Astos\ELA\MAD_H300_ELA.gtp

Start

Add

Celestial Body

Atmosphere

Wind

Hydrosphere

Magnetic Field

Environment Models

Component

Actuator

Sensor

Aerodynamics

Aerothermodynamics

Power

Thermal

Data

Vehicle Models

Vehicle

Ground Facility

Constellation

Catalog

Point of Interest

Area of Interest

Vehicles & Other Entities

Modelling

MAD_H300_ELA

Environment

Default Environment

Celestial Bodies

Earth

Atmospheres

e_atmosphere

Hydrospheres

Winds

Wind

Magnetic Fields

Vehicle Parts & Properties

Actuators

H300_20

Aerodynamics

MAD_H300_JetOff_0km

MAD_H300_JetOff_30km

MAD_H300_JetOn

Aerothermodynamics

Components

Sensors & Transmitters

Power

Data

Analyses

Variables

Optimization

Results

Files

Central body: Earth

Atmosphere: e_atmosphere

Wind: Wind

Hydrosphere: - None -

Magnetic field: - None -

Gravitational perturbation: Select ID

Third body perturbation: Select ID

Relativistic effects: Select ID

Celestial bodies: Select ID

Formulation: General Relativity

Solar radiation pressure: Disabled

Solar radiation torque: Disabled

Gravity gradient: Disabled

Environment Settings

17:17:45.5 Writing model\astos\Variables.xml...

17:17:45.5 Writing model\astos\Model_Data.xml...

17:17:45.5 Writing model\astos\Model_Definition.xml...

17:17:45.5 Writing model\astos\Dynamics_Configuration.xml...

17:17:45.5 Writing model\astos\Exports.xml...

17:17:45.5 Writing model\astos\Reports.xml...

17:17:45.5 Writing model\astos\Analyses.xml...



ASTOS - C:\Users\ESI\Desktop\Astos\ELA\MAD_H300_ELA.gtp

Celestial Body

Atmosphere

Wind

Hydrosphere

Magnetic Field

Environment Models

Component

Actuator

Sensor

Aerodynamics

Aerothermodynamics

Power

Thermal

Data

Vehicle Models

Vehicle

Ground Facility

Constellation

Catalog

Point of Interest

Area of Interest

Vehicles & Other Entities

Modelling

MAD_H300_ELA

Environment

Default Environment

Celestial Bodies

Earth

Atmospheres

e_atmosphere

Hydrospheres

Winds

Wind

Magnetic Fields

Vehicle Parts & Properties

Actuators

H300_20

Aerodynamics

MAD_H300_jetOff_0km

MAD_H300_jetOff_30km

MAD_H300_jetOn

Aerothermodynamics

Components

Sensors & Transmitters

Power

Data

Analyses

Variables

Optimization

Results

Files

Identifier: Earth

File: model\astos\Model_Data.xml

IAU ID: Earth

Defaults:

Apply

Shape:

Defined by: Spheroid

Oblateness: Polar Radius

Equatorial radius: 6378137.0

Meter

Polar radius: 6356.752

Kilo-Meter

Gravity:

Defined by: Zonal Harmonics

Gravity parameter: 3.986004418E14

Meter**3/Secon...

J2: 0.001081874

J3: 0.0

J4: 0.0

J5: 0.0

J6: 0.0

Spin state: Default

Ephemeris: Default

17:17:45.5 Writing model\astos\Variables.xml...

17:17:45.5 Writing model\astos\Model_Data.xml...

17:17:45.5 Writing model\astos\Model_Definition.xml...

17:17:45.5 Writing model\astos\Dynamics_Configuration.xml...

17:17:45.5 Writing model\astos\Exports.xml...

17:17:45.5 Writing model\astos\Reports.xml...

17:17:45.5 Writing model\astos\Analyses.xml...

Earth Model Set-Up



Modelling ASTOS - C:\Users\ESI\Desktop\Astos\ELA\MAD_H300_ELA.gtp

Start Add Model

Environment Models: Celestial Body, Atmosphere, Wind, Hydrosphere, Magnetic Field

Vehicle Models: Component, Actuator, Sensor, Aerodynamics, Aerothermodynamics, Power, Thermal, Data

Vehicles & Other Entities: Vehicle, Ground Facility, Constellation, Catalog, Point of Interest, Area of Interest

Modelling

MAD_H300_ELA

Environment

Default Environment

Celestial Bodies

Earth

Atmospheres

e_atmosphere

Hydrospheres

Winds

Wind

Magnetic Fields

Vehicle Parts & Properties

Actuators

H300_20

Aerodynamics

MAD_H300_JetOff_0km

MAD_H300_JetOff_30km

MAD_H300_JetOn

Aerothermodynamics

Components

Sensors & Transmitters

Power

Data

Analyses

Variables

Optimization

Results

Files

Identifier: e_atmosphere

Type: US Standard

Subtype: US Std 76

File: model\astos\Model_Data.xml

Density scaling factor: Enabled

Density scaling factor: 100.0 Percent

Atmospheric Model

- Density Scaling
- Blue box for Monte Carlo adjustments (to be covered later on)

17:17:45.5 Writing model\astos\Variables.xml...

17:17:45.5 Writing model\astos\Model_Data.xml...

17:17:45.5 Writing model\astos\Model_Definition.xml...

17:17:45.5 Writing model\astos\Dynamics_Configuration.xml...

17:17:45.5 Writing model\astos\Exports.xml...

17:17:45.5 Writing model\astos\Reports.xml...

17:17:45.5 Writing model\astos\Analyses.xml...



ASTOS - C:\Users\ESI\Desktop\Astos\ELA\MAD_H300_ELA.gtp

Start Add Model

Environment Models: Celestial Body, Atmosphere, Wind, Hydrosphere, Magnetic Field

Vehicle Models: Component, Actuator, Sensor, Aerodynamics, Aerothermodynamics, Power, Thermal, Data

Vehicles & Other Entities: Vehicle, Ground Facility, Constellation, Catalog, Point of Interest, Area of Interest

Modelling

MAD_H300_ELA

- Environment
 - Default Environment
 - Celestial Bodies
 - Earth
 - Atmospheres
 - e_atmosphere
 - Hydrospheres
 - Winds
 - Wind
 - Magnetic Fields
 - Vehicle Parts & Properties
 - Actuators
 - H300_20
 - Aerodynamics
 - MAD_H300_JetOff_0km
 - MAD_H300_JetOff_30km
 - MAD_H300_JetOn
 - Aerothermodynamics
 - Components
 - Sensors & Transmitters
 - Power
 - Data
 - Analyses
 - Variables
 - Optimization
 - Results
 - Files

Identifier: Wind
Type: Standard
File: model\astos\Model_Data.xml

Wind coordinates: Cartesian

Wind profile:

Velocity east:
Defined by: Value Value: 0.0 Meter/Second

Velocity north:
Defined by: Value Value: 0.0 Meter/Second

Velocity vertical: Disabled

Windshear: Disabled

Turbulences: Disabled

17:17:45.5 Writing model\astos\Variables.xml...
17:17:45.5 Writing model\astos\Model_Data.xml...
17:17:45.5 Writing model\astos\Model_Definition.xml...
17:17:45.5 Writing model\astos\Dynamics_Configuration.xml...
17:17:45.5 Writing model\astos\Exports.xml...
17:17:45.5 Writing model\astos\Reports.xml...
17:17:45.5 Writing model\astos\Analyses.xml...

Wind Profile

- Can be set in cartesian or cylindrical coordinates
- Turbulence profiles not enabled due to licensing



StartAddModel

Simulate

Analyze

Stop

Execution Log

Viewer

Astroview

Batch-Mode Inspector

Database Connections

Model Structure Viewer

Scenario Conversion Wizard

ASTOS Help

Scenario Introduction

Scenario Summary

Visit FAQ

Send Feedback

License Manager

About ASTOS

Modelling

MAD_H300_ELA

Environment

- Default Environment
- Celestial Bodies
 - Earth
- Atmospheres
 - e_atmosphere
- Hydrospheres
- Winds
 - Wind
- Magnetic Fields

Vehicle Parts & Properties

- Actuators
 - H300_20
- Aerodynamics
 - MAD_H300_JetOff_0km
 - MAD_H300_JetOff_30km
 - MAD_H300_JetOn
- Aerothermodynamics
- Components
- Sensors & Transmitters
- Power
- Data

Analyses

Variables

Optimization

Results

Files

Identifier: H300_20

Type: Rocket Engine

Subtype: Profile

File: model\astos\Model_Data.xml

Thrust scaling factor: Enabled 1.0

Nozzle ae:

- Defined by: Value
- Value: 0.028353
- Meter**2

Performance defined by: Vacuum thrust and Mass flow

Vacuum thrust:

- Defined by: Profile
- Profile:
 - Interpolation type: Linear
 - Ordinate data scale: Linear to Linear
 - Data source: File
 - Skip Lines: 0
 - Out of bounds action: Nearest Value
 - Scaling factor: 1.0
 - Filename: .\data\MAD_H300_v1_VacT_v_Time.txt

1		Data
Name	Burn Time	
Unit	Second	Kilo-Newton
Column	1	2

Perturbation (uncertainty):

- Bias: Disabled

Faulty process termination!

Engine Settings

Nozzle exhaust area

Thrust data (file or manual input)



Start

Add

Model

Simulate

Analyze

Stop

Execution Log

Viewer

Astroview

Batch-Mode Inspector

Database Connections

Model Structure Viewer

Scenario Conversion Wizard

ASTOS Help

Scenario Introduction

Scenario Summary

Visit FAQ

Send Feedback

License Manager

About ASTOS

Modelling

ASTOS - C:\Users\ESI\Desktop\Astos\ELA\MAD_H300_ELA.gtp

MAD_H300_ELA

Environment

Default Environment

Celestial Bodies

- Earth

Atmospheres

- e_atmosphere

Hydrospheres

Winds

- Wind

Magnetic Fields

Vehicle Parts & Properties

Actuators

- H300_20

Aerodynamics

- MAD_H300_jetOff_0km
- MAD_H300_jetOff_30km
- MAD_H300_jetOn

Aerothermodynamics

Components

Sensors & Transmitters

Power

Data

Analyses

Variables

Optimization

Results

Files

Identifier: H300_20

Type: Rocket Engine

Subtype: Profile

File: model\astos\Model_Data.xml

Name

Burn Time

Unit

Second

Column

1

Data

Kilo-Newton

2

Perturbation (uncertainty):

- Bias: Disabled
- Gain: Disabled

Mass flow:

- Defined by: Value
- Value: 10.019
- Scale to fit: Disabled
- Kilogram/Second

Consider jet damping effect: Enabled

Unburned propellant: Disabled

Actuation damping: Disabled

Pressurization (Turbo Pump): Disabled

Structural mass: Disabled

Mass distribution: Default

Engine Settings

Mass flow data (file or manual input)



StartAddModel

Simulate

Analyze

Stop

Execution Log

Viewer

Astrovew

Batch-Mode Inspector

Database Connections

Model Structure Viewer

Scenario Conversion Wizard

ASTOS Help

Scenario Introduction

Scenario Summary

Visit FAQ

Send Feedback

License Manager

About ASTOS

Modelling

Winds

Magnetic Fields

Vehicle Parts & Properties

Actuators

Aerodynamics

MAD_H300_JetOff_0km

MAD_H300_JetOff_30km

MAD_H300_JetOn

Aerothermodynamics

Dorado_thermo

Components

Sensors & Transmitters

Analyses

Variables

Optimization

Results

Curve Plots

Surface Plots

Condition Plots

Result Summary

Exports

MAD_H300_Compiled

Reports

Files

Identifier: MAD_H300_JetOff_0km

Type: Tabular

File: model\astos\Model_Data.xml

Aerodynamic moments definition: Centre of Pressure Position

Reference area: Defined by: Area

Area: Defined by: Value

Reference area: 0.0754

Meter**2

Reference Length: 0.31

Meter

Center of pressure: The offset is specified with respect to the global node!

X Offset: Defined by: Profile

Interpolation type: Linear

Ordinate data scale: Linear to Linear

Data source: File

Skip Lines: 0

Out of bounds action: Nearest Value

Scaling factor: 1.0

Filename: .\data\Xcp.txt

16:32:25.9 Writing model\astos\Analyses.xml...

16:32:25.9 Writing model\astos\Mission_Constraints.xml...

16:32:26.0 Simulate scenario

Aerodynamics

Reference area and length



Start

Add

Model

Simulate

Analyze

Stop

Execution Log

Viewer

Astroview

Batch-Mode Inspector

Database Connections

Model Structure Viewer

Scenario Conversion Wizard

ASTOS Help

Scenario Introduction

Scenario Summary

Visit FAQ

Send Feedback

License Manager

About ASTOS

Modelling

Winds

Magnetic Fields

Vehicle Parts & Properties

Actuators

Aerodynamics

MAD_H300_JetOff_0km

MAD_H300_JetOff_30km

MAD_H300_JetOn

Aerothermodynamics

Dorado_thermo

Components

Sensors & Transmitters

Analyses

Variables

Optimization

Results

Curve Plots

Surface Plots

Condition Plots

Result Summary

Exports

MAD_H300_Compiled

Reports

Files

Identifier: MAD_H300_JetOff_0km

Type: Tabular

File: model\astos\Model_Data.xml

Reference Length: 0.31 Meter

Center of pressure: -

The offset is specified with respect to the global node!

X Offset: -

Defined by: Profile

Profile: -

Interpolation type: Linear

Out of bounds action: Nearest Value

Ordinate data scale: Linear to Linear

Scaling factor: 1.0

Data source: File

Filename: .\data\Xcp.txt

Skip Lines: 0

	1	Data
Name	Mach	
Unit	None	Meter
Column	1	2

Bias: Disabled

Gain: Disabled

16:32:25.9 Writing model\astos\Analyses.xml...

16:32:25.9 Writing model\astos\Mission_Constraints.xml...

16:32:26.0 Simulate scenario

Aerodynamics

XCP Input

Matching descriptors for file input



StartAddModel

Simulate

Analyze

Stop

Execution Log

Viewer

Astrovew

Batch-Mode Inspector

Database Connections

Model Structure Viewer

Scenario Conversion Wizard

ASTOS Help

Scenario Introduction

Scenario Summary

Visit FAQ

Send Feedback

License Manager

About ASTOS

Modelling

Winds

Magnetic Fields

Vehicle Parts & Properties

Actuators

Aerodynamics

MAD_H300_JetOff_0km

MAD_H300_JetOff_30km

MAD_H300_JetOn

Aerothermodynamics

Dorado_thermo

Components

Sensors & Transmitters

Analyses

Variables

Optimization

Results

Curve Plots

Surface Plots

Condition Plots

Result Summary

Exports

MAD_H300_Compiled

Reports

Identifier: MAD_H300_JetOff_0km

Type: Tabular

File: model\astos\Model_Data.xml

Coefficients:

Type	Frame	Axis	Character
Force	Body-fixed (B)	Axial direction (-...)	Absolute value
Force	Body-fixed (B)	Lateral direction ...	Sideslip slope
Force	Body-fixed (B)	Normal direction...	Angle of attack s...
Moment	Body-fixed (B)	Roll moment (+X)	Aerodynamic sur...
Moment	Body-fixed (B)	Roll moment (+X)	Body roll rate slo...
Moment	Body-fixed (B)	Pitch moment (+...	Body pitch rate s...
Moment	Body-fixed (B)	Yaw moment (+Z)	Body yaw rate sl...

Add Force Coefficient

Add Damping Coefficient

Delete Selected Coefficient

Body yaw rate slope (Moment, Body-fixed (B), Yaw moment (+Z)):

Defined by: Profile

Profile:

Angle of attack reverse lookup: Disabled

Interpolation type: Linear

Ordinate data scale: Linear to Linear

Data source: File

Skip Lines: 0

Out of bounds action: Nearest Value

Scaling factor: -1.0

Filename: .\data\CM_Q_Deg.txt

	1	Data
Name	Mach	
Unit	None	None/Degree
Column	1	2

Aerodynamics

Force and moment coefficients definition

File/individual data input for force/moment coefficients

Files

16:32:25.9 Writing model\astos\Analyses.xml...



Start

Add

Model

Simulate

Analyze

Stop

Execution Log

Viewer

Astroview

Batch-Mode Inspector

Database Connections

Model Structure Viewer

Scenario Conversion Wizard

ASTOS Help

Scenario Introduction

Scenario Summary

Visit FAQ

Send Feedback

License Manager

About ASTOS

Modelling

Winds

Magnetic Fields

Vehicle Parts & Properties

Actuators

Aerodynamics

MAD_H300_JetOff_0km

MAD_H300_JetOff_30km

MAD_H300_JetOn

Aerothermodynamics

Dorado_thermo

Components

Sensors & Transmitters

Analyses

Variables

Optimization

Results

Curve Plots

Surface Plots

Condition Plots

Result Summary

Exports

MAD_H300_Compiled

Reports

Identifier: MAD_H300_JetOff_0km

Type: Tabular

File: model\astos\Model_Data.xml

Unit: None

None/Degree

Column: 1

2

Perturbation (uncertainty):

Bias: Disabled

Gain: Disabled

Aerodynamic surfaces:

ID

Surface_1

Add aerodynamic surface

Delete selected aerodynamic surface

Selected surface:

Identifier: Surface_1

Deflection:

Defined by: Value

Deflection: 0.5

Degree

Files

16:32:25.9 Writing model\astos\Analyses.xml...

Aerodynamics

Specify fin surfaces and fin cant angle



Start

Add

Model

Celestial Body

Atmosphere

Wind

Hydrosphere

Magnetic Field

Component

Actuator

Sensor

Aerodynamics

Aerothermodynamics

Power

Thermal

Data

Vehicle

Ground Facility

Constellation

Catalog

Point of Interest

Area of Interest

Modelling

ASTOS - C:\Users\ESI\Desktop\Astos\ELA\MAD_H300_ELA.gtp

Identifier: MAD_H300_S1

Type: Basic Vehicle Stage

File: model\astos\Model_Data.xml

Propellant type: Solid

Filling ratio: Common

Filling ratio: 1.0

Dimensions: Custom

X: 4632.5

Y: 310.0

Z: 310.0

Structural mass: 139.0

Propellant mass: 158.0

Residual Propellant mass: Custom

Propellant mass type: Reference

Reference: 0.1

Mass distribution: Default

Analyses

Variables

Optimization

Results

Curve Plots

Surface Plots

Condition Plots

Result Summary

Exports

MAD_H300_Compiled

Reports

Files

16:32:25.9 Writing model\astos\Analyses.xml...

Components - Stage

Dimensions and mass specifications



StartAddModel

Celestial Body

Atmosphere

Wind

Hydrosphere

Magnetic Field

Environment Models

Component

Actuator

Sensor

Aerodynamics

Aerothermodynamics

Power

Thermal

Data

Vehicle Models

Vehicle

Ground Facility

Constellation

Catalog

Point of Interest

Area of Interest

Vehicles & Other Entities

Modelling

Dorado_thermo

Components

MAD_H300_Nosecone

MAD_H300_S1

Sensors & Transmitters

IMU

Power

Data

Thermal

Vehicles & POIs Definition

MAD_H300

KTR

Analyses

Variables

Optimization

Results

Curve Plots

Surface Plots

Condition Plots

Result Summary

Exports

MAD_H300_Compiled

Reports

Files

ASTOS - C:\Users\EST\Desktop\Astos\ELA\MAD_H300_ELA.gtp

Identifier: MAD_H300_Nosecone

Type: Auxiliary

File: model\astos\Model_Data.xml

Dimensions: Custom

X: 1079.5 Milli-Meter

Y: 310.0 Milli-Meter

Z: 310.0 Milli-Meter

Shape: Cylinder

Cylinder axis: X

Total mass: 9.0 Kilogram

Mass distribution: Default

Components - Auxiliary

Dimensions and mass specifications

16:32:25.9 Writing model\astos\Analyses.xml...



Modelling ASTOS - C:\Users\ESI\Desktop\Astos\ELA\MAD_H300_ELA.gtp

Start Add Model

Celestial Body Atmosphere Wind Hydrosphere Magnetic Field Component Actuator Sensor Aerodynamics Aerothermodynamics Power Thermal Data Vehicle Ground Facility Constellation Catalog Point of Interest Area of Interest

Environment Models Vehicle Models Vehicles & Other Entities

Modelling

- Components
 - MAD_H300_Nosecone
 - MAD_H300_S1
- Sensors & Transmitters
 - IMU
- Power
- Data
- Thermal

Vehicles & POIs Definition

- MAD_H300
- KTR

Dynamics Configuration

Analyses

Variables

Optimization

Results

Curve Plots

Surface Plots

Condition Plots

Result Summary

Exports

MAD_H300_Compiled

Reports

Files

Identifier: MAD_H300

Type: Rocket

File: model\astos\Model_Definition.xml

Vehicle Structure

- MAD_H300
 - Nosecone
 - MAD_Nosecone [MAD_H300_Nosecone]
 - S_1
 - MAD_Engine [H300_20]
 - MAD_S1 [MAD_H300_S1]

Placement Visualization Propulsion

Reference element: MAD_S1

Reference node: Bottom (-x)

Pre-rotation position offset

X: 0.0 Meter

Y: 0.0 Milli-Meter

Z: 0.0 Milli-Meter

Nominal orientation:

Rotation sequence: XYZ

Vehicle Preview

Use data from initial guess

Node Visualization

Node Placement



StartAddModel

Celestial Body

Atmosphere

Wind

Hydrosphere

Magnetic Field

Environment Models

Component

Actuator

Sensor

Aerodynamics

Aerothermodynamics

Power

Thermal

Data

Vehicle Models

Vehicle

Ground Facility

Constellation

Catalog

Point of Interest

Area of Interest

Vehicles & Other Entities

Dyna

Modelling

ASTOS - C:\Users\ESI\Desktop\Astos\ELA\MAD_H300_ELA.gtp

Components

MAD_H300_Nosecone

MAD_H300_S1

Sensors & Transmitters

IMU

Power

Data

Thermal

Vehicles & POIs Definition

MAD_H300

KTR

Dynamics Configuration

Analyses

Variables

Optimization

Results

Curve Plots

Surface Plots

Condition Plots

Result Summary

Exports

MAD_H300_Compiled

Reports

Identifier: MAD_H300

Type: Rocket

File: model\astos\Model_Definition.xml

Vehicle Structure

MAD_H300

Nosecone

MAD_Nosecone [MAD_H300_Nosecone]

S_1

MAD_Engine [H300_20]

MAD_S1 [MAD_H300_S1]

Placement

Visualization

Anchor node: Bottom (-x)

Reference element: Global

Pre-rotation position offset

X: 0.0

Meter

Y: 0.0

Meter

Z: 0.0

Meter

Nominal orientation

Rotation sequence: XYZ

Vehicle Preview

Use data from initial guess

Global node

Vehicle Definition

X Offset values are measured from global node

16:32:25.9

Writing model\astos\Analyses.xml...



Vehicle Definition

Vehicle Preview

Use data from initial guess

Node placement for other components

Anchor node: Bottom (-x)

Reference element: MAD_S1

Reference node: Top (x)

Pre-rotation position offset:

X: 0.0 Meter

Y: 0.0 Meter

Z: 0.0 Meter

Nominal orientation:

Modelling ASTOS - C:\Users\ESI\Desktop\Astos\ELA\MAD_H300_ELA.gtp

Start Add Model

Celestial Body Atmosphere Wind Hydrosphere Magnetic Field Component Actuator Sensor Aerodynamics Aerothermodynamics Power Thermal Data Vehicle Ground Facility Constellation Catalog Point of Interest Area of Interest

Environment Models Vehicle Models Vehicles & Other Entities

Modelling

- Components
 - MAD_H300_Nosecone
 - MAD_H300_S1
- Sensors & Transmitters
 - IMU
- Power
- Data
- Thermal
- Vehicles & POIs Definition
 - MAD_H300
 - KTR
- Dynamics Configuration

Analyses

Variables

Optimization

Results

Curve Plots

Surface Plots

Condition Plots

Result Summary

Exports

MAD_H300_Compiled

Reports

Files

16:32:25.9 Writing model\astos\Analyses.xml...



StartAdd

Celestial Body

Atmosphere

Wind

Hydrosphere

Magnetic Field

Environment Models

Component

Actuator

Sensor

Aerodynamics

Aerothermodynamics

Power

Thermal

Data

Vehicle Models

Vehicle

Ground Facility

Constellation

Catalog

Point of Interest

Area of Interest

Vehicles & Other Entities

Modelling

Vehicles & POIs Definition

- MAD_H300
- KTR

Dynamics Configuration

- Phases & Common Settings
 - Ignition
 - Rail
 - Thrust
 - Coast
 - Coast_Above30km
- Vehicles & POIs Dynamics
 - MAD_H300

Analyses

Variables

Optimization

Results

- Curve Plots
- Surface Plots
- Condition Plots
- Result Summary
- Exports
 - MAD_H300_Compiled
- Reports

Files

Mission start date:

Time standard: TTDate format: Calendar Date

Calendar date:

Year: 2000Month: 1Day: 1Hour: 0Minute: 0Second: 0.0

Offset: Disabled

Independent variable: Time (t)

Default simulation settings:

Integration:

Integration method: Dormand-Prince 4/5Integration error: 1.0E-8

Normalized step size: EnabledMinimum step size: 1.0E-10Maximum step size: Disabled

Ignore the minimum step size and just print a warning if the step size becomes smaller than the minimum: Enabled

Output spacing:

Specified by: Interval length

Interval length: 0.05 [Second]

Phases:

Use	Index	Phase ID	Description
☒	1	Ignition	
☒	2	Rail	
☒	3	Thrust	
☒	4	Coast	
☒	5	Coast_Above30km	

16:32:25.9Writing model\astos\Analyses.xml...

Phase Settings

Temporal discretization

"Checked" status – to be computed



StartAddPhase

Celestial Body

Atmosphere

Wind

Hydrosphere

Magnetic Field

Environment Models

Component

Actuator

Sensor

Aerodynamics

Aerothermodynamics

Power

Thermal

Data

Vehicle Models

Vehicle

Ground Facility

Constellation

Catalog

Point of Interest

Area of Interest

Vehicles & Other Entities

Modelling

ASTOS - C:\Users\ESI\Desktop\Astos\ELA\MAD_H300_ELA.gtp

Vehicles & POIs Definition

MAD_H300

KTR

Dynamics Configuration

Phases & Common Settings

Ignition

Rail

Thrust

Coast

Coast_Above30km

Vehicles & POIs Dynamics

MAD_H300

Analyses

Variables

Optimization

Results

Results

Curve Plots

Surface Plots

Condition Plots

Result Summary

Exports

MAD_H300_Compiled

Reports

Description:

Phase span defined by:

Mission Time

2.0

Second

Additional phase end conditions:

Enabled

One condition or

All conditions must be fulfilled

Position

Remove

Is active:

Enabled

Vehicle ID:

MAD_H300

Phase ends if:

value equal or greater than reference

Reference:

10.0

Meter

Constraint applies to:

Default configurations:

Apply configuration

Frame:

PCPF

Representation:

Spherical

Coordinate:

Altitude

Add

Simulation settings:

Default

16:32:25.9

Writing model\astos\Analyses.xml...

Phase Settings

Specify length of phase (based on duration or end-point using mission time)

Boolean condition for end-of-phase



ASTOS - C:\Users\ESI\Desktop\Astos\ELA\MAD_H300_ELA.gtp

Start

Add

Celestial Body

Atmosphere

Wind

Hydrosphere

Magnetic Field

Component

Actuator

Sensor

Aerodynamics

Aerothermodynamics

Power

Thermal

Data

Vehicle

Ground Facility

Constellation

Catalog

Point of Interest

Area of Interest

Environment Models

Vehicle Models

Vehicles & Other Entities

Modelling

Vehicles & POIs Definition

MAD_H300

KTR

Dynamics Configuration

Phases & Common Settings

Ignition

Rail

Thrust

Coast

Coast_Above30km

Vehicles & POIs Dynamics

MAD_H300

Analyses

Variables

Optimization

Results

Curve Plots

Surface Plots

Condition Plots

Result Summary

Exports

MAD_H300_Compiled

Reports

Initial State

Default Settings

Ignition

Rail

Thrust

Coast

Coast_Above30km

State type:

Position & Velocity

Position:

Frame: PCPF

Representation: Polar

Altitude type: Altitude

Latitude type: Latitude

Reference point: Global

Altitude: 0.0 Meter

Longitude: 136.796342 Degree

Latitude: -12.389436 Degree

Velocity:

Reference frame: Relative PCPF

Representation frame: L

Representation: Polar

Speed: 0.0 Kilo-Meter/Seco...

Inclination: 85.0 Degree

Heading: 225.0 Degree

Epoch differs from mission start date:

Disabled

16:32:25.9

Writing model\astos\Analyses.xml...

Dynamics Settings

Initial lat, long, alt specification

Launch angle and azimuth



ASTOS - C:\Users\ESI\Desktop\Astos\ELA\MAD_H300_ELA.gtp

Start Add

Celestial Body

Atmosphere

Wind

Hydrosphere

Magnetic Field

Component

Actuator

Sensor

Aerodynamics

Aerothermodynamics

Power

Thermal

Data

Vehicle

Ground Facility

Constellation

Catalog

Point of Interest

Area of Interest

Environment Models

Vehicle Models

Vehicles & Other Entities

Modelling

Vehicles & POIs Definition

Dynamics Configuration

Phases & Common Settings

Vehicles & POIs Dynamics

Analyses

Variables

Optimization

Results

Initial State

Default Settings

Ignition

Rail

Thrust

Coast

Coast_Above30km

Environment: ☒ Default ☐ As Previous Phase ☒ Individual

Aerodynamics configuration: MAD_H300_JetOn

Aerothermodynamics configuration: Dorado_thermo

Maneuver at beginning of phase:

Impulse: Disabled

Spin impulse: Disabled

Environment:

Central body: Earth

Atmosphere: e_atmosphere

Wind: Wind

Hydrosphere: - None -

Magnetic field: - None -

Gravitational perturbation:

Third body perturbation:

Relativistic effects:

Celestial bodies:

Formulation: General Relativity

Files

16:32:25.9 Writing model\astos\Analyses.xml...

Dynamics Settings

Aerodynamics

Environment specifications



ASTOS - C:\Users\ESI\Desktop\Astos\ELA\MAD_H300_ELA.gtp

Start

Add

Celestial Body

Atmosphere

Wind

Hydrosphere

Magnetic Field

Component

Actuator

Sensor

Aerodynamics

Aerothermodynamics

Power

Thermal

Data

Vehicle

Ground Facility

Constellation

Catalog

Point of Interest

Area of Interest

Environment Models

Vehicle Models

Vehicles & Other Entities

Modelling

Vehicles & POIs Definition

Dynamics Configuration

Phases & Common Settings

Vehicles & POIs Dynamics

Analyses

Variables

Optimization

Results

Results

Curve Plots

Surface Plots

Condition Plots

Result Summary

Exports

Reports

Files

Initial State

Default Settings

Ignition

Rail

Thrust

Coast

Coast_Above30km

Equations of motion:

Defined by: Inertial Velocity

Attitude:

Defined by: Euler Angles

Control/State: State

Coordinate frame: L

Magnetic moment: Disabled

Mass Distribution: Custom

Structure and consumables: Combined

Combined:

Center of mass:

X Offset

Defined by: Profile

Profile X_Offset:

Interpolation type: Linear

Ordinate data scale: Linear to Linear

Data source: Local

Out of bounds action: Nearest Value

Scaling factor: 1.0

Preview

Name	Time	Data
Unit	Second	Meter
1	0.0	2.232
2	15.77	2.14

Dynamics Settings

Equations of motion

Attitude Control

CG input

16:32:25.9

Writing model\astos\Analyses.xml...



ASTOS - C:\Users\ESI\Desktop\Astos\ELA\MAD_H300_ELA.gtp

StartAdd

Celestial Body

Atmosphere

Wind

Hydrosphere

Magnetic Field

Component

Actuator

Sensor

Aerodynamics

Aerothermodynamics

Power

Thermal

Data

Vehicle

Ground Facility

Constellation

Catalog

Point of Interest

Area of Interest

Environment Models

Vehicle Models

Vehicles & Other Entities

Modelling

Initial State

Default Settings

Ignition

Rail

Thrust

Coast

Coast_Above30km

Vehicles & POIs Definition

MAD_H300

KTR

Dynamics Configuration

Phases & Common Settings

Ignition

Rail

Thrust

Coast

Coast_Above30km

Vehicles & POIs Dynamics

MAD_H300

Analyses

Variables

Optimization

Results

Results

Curve Plots

Surface Plots

Condition Plots

Result Summary

Exports

MAD_H300_Compiled

Reports

Files

Y Offset

Defined by: Value

Value: 0.0

Milli-Meter

Z Offset

Defined by: Value

Value: 0.0

Milli-Meter

Moments of inertia: XX

Defined by: Profile

Profile XX

Interpolation type: Linear

Out of bounds action: Nearest Value

Ordinate data scale: Linear to Linear

Scaling factor: 1.0

Data source: Local

Preview

Name	Time	Data
Unit	Second	Kilogram*Meter**2
1	0.0	4.1845
2	15.77	1.8019
*		

Perturbation (uncertainty):

Bias: Disabled

Gain: Disabled

Dynamics Settings

CG Input (Y and Z Offsets)

MOI Input XX

16:32:25.9 Writing model\astos\Analyses.xml...



ASTOS - C:\Users\ESI\Desktop\Astos\ELA\MAD_H300_ELA.gtp

Start Add

Celestial Body

Atmosphere

Wind

Hydrosphere

Magnetic Field

Component

Actuator

Sensor

Aerodynamics

Aerothermodynamics

Power

Thermal

Data

Vehicle

Ground Facility

Constellation

Catalog

Point of Interest

Area of Interest

Environment Models Vehicle Models Vehicles & Other Entities

Modelling

Vehicles & POIs Definition

- MAD_H300
- KTR

Dynamics Configuration

- Phases & Common Settings
 - Ignition
 - Rail
 - Thrust
 - Coast
 - Coast_Above30km
- Vehicles & POIs Dynamics
 - MAD_H300

Analyses

Variables

Optimization

Results

Initial State

Default Settings

Ignition

Rail

Thrust

Coast

Coast_Above30km

YY

Defined by: Profile

Profile YY:

Interpolation type: Linear

Out of bounds action: Nearest Value

Ordinate data scale: Linear to Linear

Scaling factor: 1.0

Data source: Local

Preview

1		Data
Name	Time	
Unit	Second	Kilogram*Meter**2
1	0.0	1285.77
2	15.77	523.84
*		

Perturbation (uncertainty):

Bias: Disabled

Gain: Disabled

ZZ

Defined by: Profile

Profile ZZ:

Interpolation type: Linear

Out of bounds action: Nearest Value

16:32:25.9 Writing model\astos\Analyses.xml...

Dynamics Settings

MOI Input YY
(Same for ZZ)



ASTOS - C:\Users\ESI\Desktop\Astos\ELA\MAD_H300_ELA.gtp

Start

Add

Celestial Body

Atmosphere

Wind

Hydrosphere

Magnetic Field

Environment Models

Component

Actuator

Sensor

Aerodynamics

Aerothermodynamics

Power

Thermal

Data

Vehicle Models

Vehicle

Ground Facility

Constellation

Catalog

Point of Interest

Area of Interest

Vehicles & Other Entries

Modelling

Vehicles & POIs Definition

MAD_H300

KTR

Dynamics Configuration

Phases & Common Settings

Ignition

Rail

Thrust

Coast

Coast_Above30km

Vehicles & POIs Dynamics

MAD_H300

Analyses

Variables

Optimization

Results

Results

Curve Plots

Surface Plots

Condition Plots

Result Summary

Exports

MAD_H300_Compiled

Reports

Files

Initial State

Default Settings

Ignition

Rail

Thrust

Coast

Coast_Above30km

Perturbation (uncertainty):

Bias: Disabled

Gain: Disabled

XY

Defined by: Value Value: 0.0 Kilogram*Meter*...

XZ

Defined by: Value Value: 0.0 Kilogram*Meter*...

YZ

Defined by: Value Value: 0.0 Kilogram*Meter*...

Flexible dynamics: Disabled

Auxiliary states:

Horizontal range: Disabled

Trajectory smoothness: Disabled

Velocity increment (delta V): Disabled

Total impulse: Disabled

Drag loss: Disabled

Gravity loss: Disabled

Steering loss: Disabled

Ozone load: Disabled

Heat load: Disabled

Average drag deviation: Disabled

16:32:25.9

Writing model\astos\Analyses.xml...

Dynamics Settings

MOI Input XY, XZ, YZ



ASTOS - C:\Users\ESI\Desktop\Astos\ELA\MAD_H300_ELA.gtp

Celestial Body

Atmosphere

Wind

Hydrosphere

Magnetic Field

Component

Actuator

Sensor

Aerodynamics

Aerothermodynamics

Power

Thermal

Data

Vehicle

Ground Facility

Constellation

Catalog

Point of Interest

Area of Interest

Environment Models

Vehicle Models

Vehicle & Other Entities

Modelling

Initial State

Default Settings

Ignition

Rail

Thrust

Coast

Coast_Above30km

Vehicles & POIs Definition

MAD_H300

KTR

Dynamics Configuration

Phases & Common Settings

Ignition

Rail

Thrust

Coast

Coast_Above30km

Vehicles & POIs Dynamics

MAD_H300

Analyses

Variables

Optimization

Results

Results

Curve Plots

Surface Plots

Condition Plots

Result Summary

Exports

MAD_H300_Compiled

Reports

Files

Aerodynamics configuration:

Aerothermodynamics configuration:

Maneuver at Beginning of Phase:

Environment:

Equations of motion:

Attitude:

Magnetic moment:

Mass Distribution:

Flexible dynamics:

☐ Default

☐ As Previous Phase

☐ Individual

☐ Default

☐ As Previous Phase

☐ Individual

☐ Default

☐ As Previous Phase

☒ Individual

☐ Default

☐ As Previous Phase

☐ Individual

☐ Default

☐ As Previous Phase

☐ Individual

☐ Default

☐ As Previous Phase

☒ Individual

☐ Default

☐ As Previous Phase

☐ Individual

☐ Default

☐ As Previous Phase

☐ Individual

☐ Default

☐ As Previous Phase

☐ Individual

Aerodynamics configuration:

Aerothermodynamics configuration:

Active actuators:

Jettisoned assemblies at end of phase:

Maneuver at beginning of phase:

MAD_H300_jettOn

Dorado thermo

Select

ID

☒ MAD_Engine

[1/1]

Select

Assembly ID

☐ Nosecone

☐ S_1

[0/2]

Impulse:

Disabled

Spin impulse:

Disabled

16:32:25.9

Writing model\astos\Analyses.xml...

Dynamics Settings

Dynamics customization depending on phases