FreeFlyer Engineer 7.8.1.50021 (Nanosecond) - Hohman Edit - [Output]

File Options Workspace Window Help

Home Control Output Notes

Workspace 1 | Workspace 4 | Workspace 5

MissionView 9 | Report 10

Jan 02 2020 04:10:00.273848134

Mission Status and Information

SNS 419
Maneuver-Hohmann Transfer

By:
Abdelrahman Ramadan Farag
Maged Michael Seha Ikladious
Mostafa Mohammed Mostafa Tawfik

Our spacecraft has a semi major axis of 7000 km and is in a circular orbit. We wish to put it at a 20000 km semi major axis circular orbit. Calculate the total amount of ?v Required to transfer to the new orbit using a Hohmann transfer.

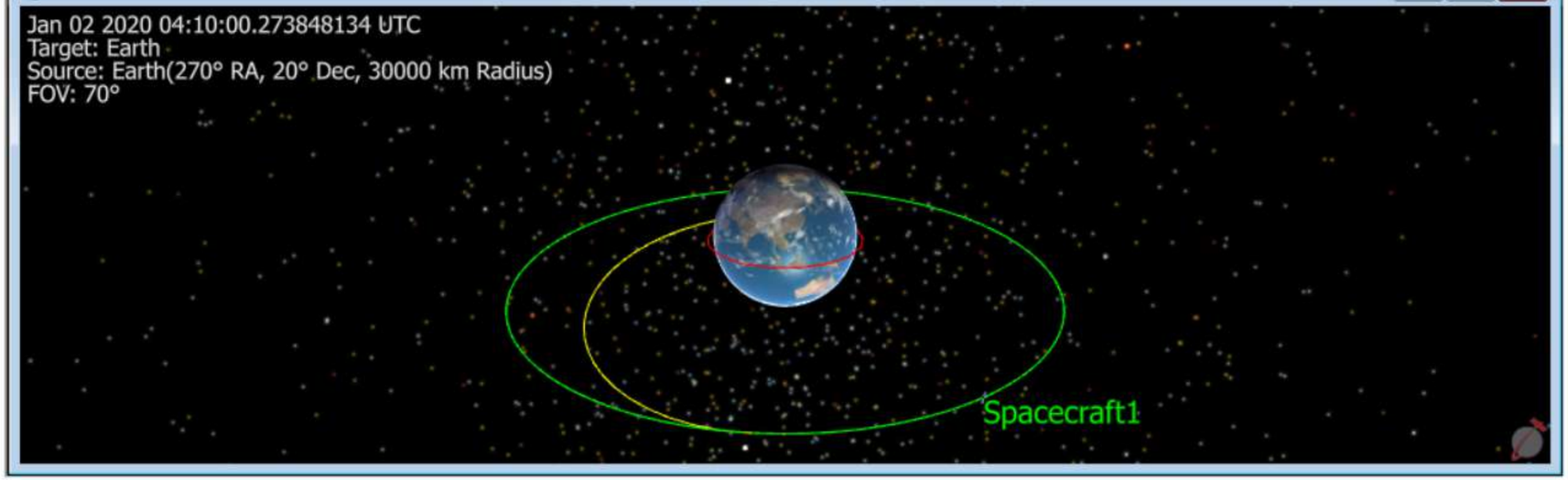
SemiMajorAxis-Transfer orbit: 13500.000000000 km

dv1: 1.638710281 km/s
dv2: 1.249638081 km/s
totalDV: 2.888348362 km/s

Report 10

dV1	dV2	totalDV
1.638710281	1.249638081	2.888348362

MissionView 9



Output Properties

Selected Component: MissionView 9

Print | Export

All Output Properties...

Viewpoint: Current: None

View Mode: 3D View

Reference Frame: MJ2000

Source: Earth

Source Offsets

Right Ascension: 270 deg

Declination: 20 deg

Translation: 30000 km

Field Of View: 70 deg

Target: Earth

Tail Reference: Earth

Status Message: The Mission Plan executed successfully.

Status: Stopped

Run Duration: 1 s

ENG 9:22 PM 12/21/2023

FreeFlyer Engineer 7.8.1.50021 (Nanosecond) - Hohman Edit - [Output]

File Options Workspace Window Help

Home Control Output Notes

Workspace 1 Workspace 4 Workspace 5

MissionView 9 Report 10

1/2 Jan 02 2020 04:10:00.273848134

Mission Status and Information

SNS 419
Maneuver-Hohmann Transfer

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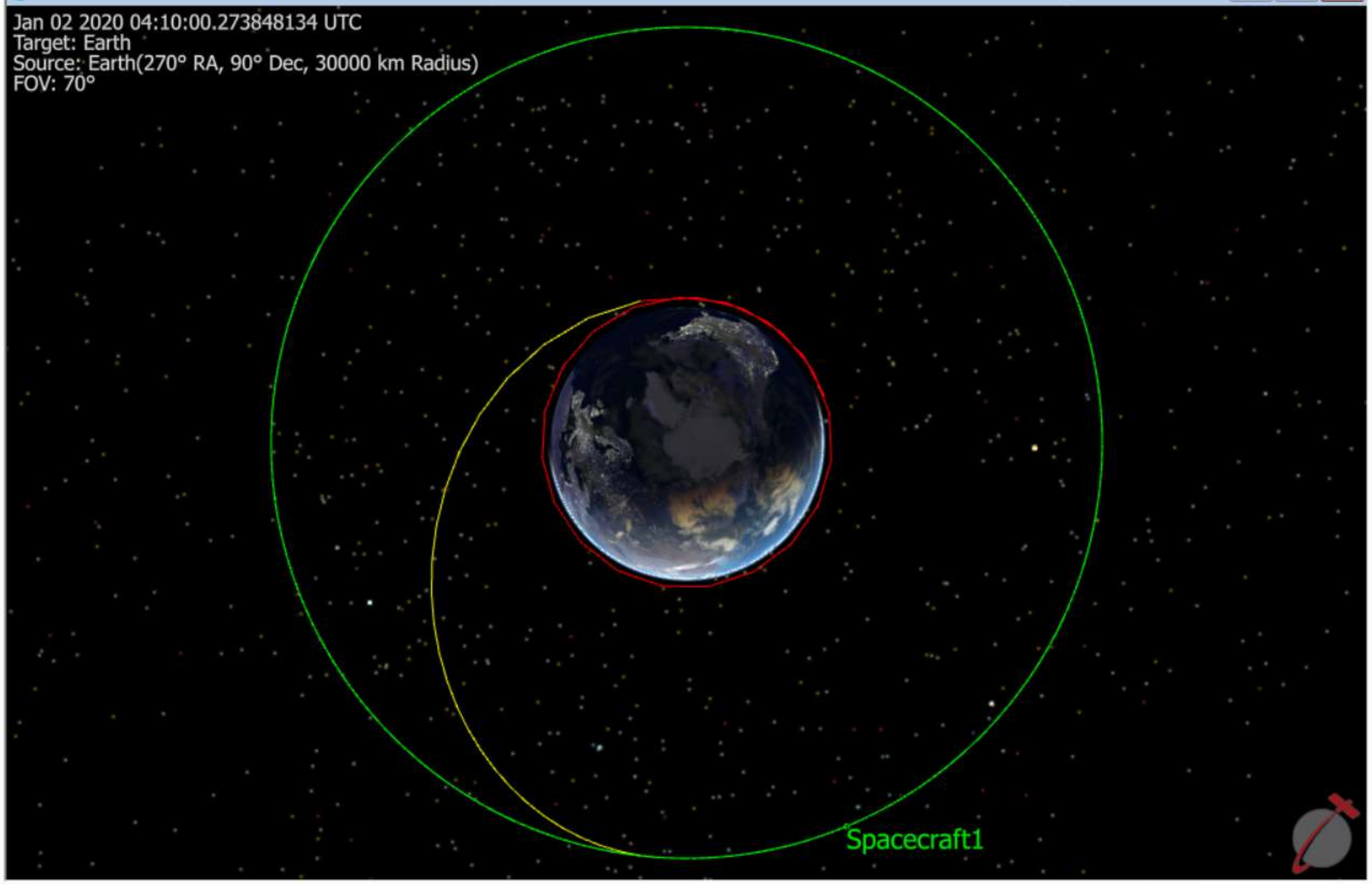
MissionView 9



Output Properties

Selected Component:
MissionView 9
Print Export
All Output Properties...
Viewpoint
Current: None
View Mode
3D View
Reference Frame
MJ2000
Source
Earth
Source Offsets
Right Ascension
270 deg
Declination
90 deg
Translation
30000 km
Field Of View
70 deg
Target
Earth
Tail Reference
Earth

Status Message: The Mission Plan executed successfully.
Status: Stopped
Run Duration: 1 s

ENG 9:25 PM 12/21/2023

FreeFlyer Engineer 7.8.1.50021 (Nanosecond) - Hohman Edit - [Control]

File Options Workspace Window Help

Home Control Output Notes

Object Browser

Add Edit View

ConsoleWindow
- Console (G)

ImpulsiveBurn
- ImpulsiveBurn1
- ImpulsiveBurn2

SolarSystem
- FF_SolarSystem (G)

Spacecraft
- Spacecraft1

ViewWindow
- ViewWindow1

Object Browser | Externals

Mission Sequence | 1 - console setup | 10 - data to console

FreeForm Label: console setup — Print

```
1  // Console Setup
2  Console.Dimension = 43;
3  Console.Show();
4  Console.WordWrap  = 1;
5  Console.DockMode  = 3;
6  Console.BackColor = ColorTools.Black;
7  Console.CurrentTextColor = ColorTools.DarkCyan;
8  Console.WindowTitle = "Mission Status and Information";
9
10 Report " SNS 419 " to Console;
11 Report " Maneuver-Hohmann Transfer " to Console;
12
13
14 Report " " to Console;
15
16
17 Report " By: " to Console;
18 Report " Abdelrahman Ramadan Farag " to Console;
19 Report " Maged Michael Seha Ikladious " to Console;
20 Report " Mostafa Mohammed Mostafa Tawfik " to Console;
21
22 Report " " to Console;
23
24
25 Report " Our spacecraft has a semi major axis of 7000 km and is in a circular orbit. We wish to put it at a 20000 km semi major axis ci
26
```

Line: 7 Column: 47 Offset: 188

Script Elements

- Block...End
- FreeForm
- Assign(=)
- Call
- Close
- For...End
- Get
- If...End
- Include
- Maneuver
- Open
- Pause
- Plot
- Put
- Receive
- Report
- Restore
- Save
- Send
- Show
- Step
- Stop
- Target...End
- Try...End
- Update
- View
- Watch
- While...End

Status Message: The Mission Plan executed successfully. | Status: Stopped | Run Duration: 1 s

ENG 9:26 PM 12/21/2023

FreeFlyer Engineer 7.8.1.50021 (Nanosecond) - Hohman Edit - [Control]

File Options Workspace Window Help

Home Control Output Notes

Object Browser

Add Edit View

ConsoleWindow

Console (G)

ImpulsiveBurn

ImpulsiveBurn1
ImpulsiveBurn2

SolarSystem

FF_SolarSystem (G)

Spacecraft

Spacecraft1

ViewWindow

ViewWindow1

Object Browser Externals

Mission Sequence 2 - inputs

FreeForm Label inputs Print

```
1
2  Variable InitialRadius = 7000 ;
3
4  Variable FinalRadius = 20000 ;
```

Line: 1 Column: 1 Offset: 1

Script Elements

Block...End
FreeForm
Assign(=)
Call
Close
For...End
Get
If...End
Include
Maneuver
Open
Pause
Plot
Put
Receive
Report
Restore
Save
Send
Show
Step
Stop
Target...End
Try...End
Update
View
Watch
While...End

Status Message: The Mission Plan executed successfully.

Status: Stopped

Run Duration: 1 s

ENG 9:26 PM 12/21/2023

FreeFlyer Engineer 7.8.1.50021 (Nanosecond) - Hohman Edit - [Control]

File Options Workspace Window Help

Home Control Output Notes

Object Browser

Add Edit View

ConsoleWindow
Console (G)

ImpulsiveBurn
ImpulsiveBurn1
ImpulsiveBurn2

SolarSystem
FF_SolarSystem (G)

Spacecraft
Spacecraft1

ViewWindow
ViewWindow1

Object Browser Externals

Mission Sequence | 2 - inputs | 3 - calculations

FreeForm Label: calculations Print

```
1  // initial Speed Orbit
2
3  Variable vInitial = sqrt(Earth.Mu * ( (2/InitialRadius) - (1/InitialRadius) ));
4
5
6  // Semi-Major Axis of the transfer trajectory
7
8  Variable SemiMajorTransfer = (FinalRadius + InitialRadius)/2;
9
10
11 // Velocity at periapsis of the transfer trajectory
12
13 Variable vTransfPeri = sqrt(Earth.Mu * ( (2/InitialRadius) - (1/SemiMajorTransfer) ));
14
15
16 // Delta V of the first maneuver
17
18 Variable dV1 = vTransfPeri - vInitial;
19
20
21 // Velocity at apoapsis of the transfer trajectory
22
23 Variable vTransfApog = sqrt(Earth.Mu * ( (2/FinalRadius) - (1/SemiMajorTransfer) ));
24
25
26 // Velocity of the final orbit
27
28 Variable vFinal = sqrt(Earth.Mu * ( (2/FinalRadius) - (1/FinalRadius) ));
29
30
31 // Delta V of the second Maneuver
32
33 Variable dV2 = vFinal - vTransfApog;
34
35
36 // Total Delta V required
37
```

Line: 1 Column: 1 Offset: 1

Script Elements

Block...End
FreeForm
Assign(=)
Call
Close
For...End
Get
If...End
Include
Maneuver
Open
Pause
Plot
Put
Receive
Report
Restore
Save
Send
Show
Step
Stop
Target...End
Try...End
Update
View
Watch
While...End

Status Message: The Mission Plan executed successfully.

Status: Stopped

Run Duration: 1 s

ENG 9:26 PM 12/21/2023

FreeFlyer Engineer 7.8.1.50021 (Nanosecond) - Hohman Edit - [Control]

File Options Workspace Window Help

Home Control Output Notes

Object Browser

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ConsoleWindow
Console (G)

ImpulsiveBurn
ImpulsiveBurn1
ImpulsiveBurn2

SolarSystem
FF_SolarSystem (G)

Spacecraft
Spacecraft1

ViewWindow
ViewWindow1

Object Browser Externals

Mission Sequence | 2 - inputs | 3 - calculations

FreeForm Label: calculations Print

```
17
18  Variable dV1 = vTransfPeri - vInitial;
19
20
21  // Velocity at apoapsis of the transfer trajectory
22
23  Variable vTransfApog = sqrt(Earth.Mu * ( (2/FinalRadius) - (1/SemiMajorTransfer) ));
24
25
26  // Velocity of the final orbit
27
28  Variable vFinal = sqrt(Earth.Mu * ( (2/FinalRadius) - (1/FinalRadius) ));
29
30
31  // Delta V of the second Maneuver
32
33  Variable dV2 = vFinal - vTransfApog;
34
35
36  // Total Delta V required
37
38  Variable totalDV = dV1 + dV2;
39
40
41
42
43  // Assigns the InitialRadius to the spacecraft
44  // to ensure the Spacecraft SMA is the same as the one the user defined
45  Spacecraft1.A = InitialRadius;
46
```

Line: 1 Column: 1 Offset: 1

Script Elements

Block...End
FreeForm
Assign(=)
Call
Close
For...End
Get
If...End
Include
Maneuver
Open
Pause
Plot
Put
Receive
Report
Restore
Save
Send
Show
Step
Stop
Target...End
Try...End
Update
View
Watch
While...End

Status Message: The Mission Plan executed successfully.

Status: Stopped

Run Duration: 1 s

ENG 9:26 PM 12/21/2023

FreeFlyer Engineer 7.8.1.50021 (Nanosecond) - Hohman Edit - [Control]

File Options Workspace Window Help

Home Control Output Notes

Object Browser

Add Edit View

ConsoleWindow
Console (G)

ImpulsiveBurn
ImpulsiveBurn1
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SolarSystem
FF_SolarSystem (G)

Spacecraft
Spacecraft1

ViewWindow
ViewWindow1

Object Browser Externals

Mission Sequence | 8 - perform maneuver 1

FreeForm Label: perform maneuver 1 Print

```
1  // Changes color of SpaceCraft tail
2
3  Spacecraft1.Color = ColorTools.Yellow;
4
5
6  // Assigns the calculated delta v value to the Impulsive Burn
7
8  ImpulsiveBurn1.BurnDirection[0] = dV1;
9
10
11 Maneuver Spacecraft1 using ImpulsiveBurn1;
12
13
14 // Steps the Spacecraft to apoapsis and visualizes the Spacecraft
15
16 WhileStepping Spacecraft1 to (Spacecraft1.OrbitApoapsis);
17
18  Update ViewWindow1;
19
20 End;
21
```

Line: 1 Column: 1 Offset: 1

Script Elements

Block...End
FreeForm
Assign(=)
Call
Close
For...End
Get
If...End
Include
Maneuver
Open
Pause
Plot
Put
Receive
Report
Restore
Save
Send
Show
Step
Stop
Target...End
Try...End
Update
View
Watch
While...End

Status Message: The Mission Plan executed successfully.

Status: Stopped

Run Duration: 1 s

ENG 9:26 PM 12/21/2023

FreeFlyer Engineer 7.8.1.50021 (Nanosecond) - Hohman Edit - [Control]

File Options Workspace Window Help

Home Control Output Notes

Object Browser

Add Edit View

ConsoleWindow
Console (G)

ImpulsiveBurn
ImpulsiveBurn1
ImpulsiveBurn2

SolarSystem
FF_SolarSystem (G)

Spacecraft
Spacecraft1

ViewWindow
ViewWindow1

Object Browser Externals

Mission Sequence | 8 - perform maneuver 1 | 9 - preform maneuver 2

FreeForm Label: preform maneuver 2 Print

```
1  // Changes the color of SpaceCraft tail again
2
3  Spacecraft1.Color = ColorTools.Lime;
4
5
6  // Sets the calculated delta v to the Impulsive Burn
7
8  ImpulsiveBurn2.BurnDirection[0] = dV2;
9
10
11 Maneuver Spacecraft1 using ImpulsiveBurn2;
12
13
14 // Reports the delta v values
15
16 Report dV1, dV2, totalDV;
17
```

Line: 1 Column: 1 Offset: 1

Script Elements

Block...End
FreeForm
Assign(=)
Call
Close
For...End
Get
If...End
Include
Maneuver
Open
Pause
Plot
Put
Receive
Report
Restore
Save
Send
Show
Step
Stop
Target...End
Try...End
Update
View
Watch
While...End

Status Message: The Mission Plan executed successfully.

Status: Stopped

Run Duration: 1 s

ENG 9:26 PM 12/21/2023

FreeFlyer Engineer 7.8.1.50021 (Nanosecond) - Hohman Edit - [Control]

File Options Workspace Window Help

Home Control Output Notes

Object Browser

Add Edit View

ConsoleWindow
- Console (G)

ImpulsiveBurn
- ImpulsiveBurn1
- ImpulsiveBurn2

SolarSystem
- FF_SolarSystem (G)

Spacecraft
- Spacecraft1

ViewWindow
- ViewWindow1

Object Browser | Externals

Mission Sequence | 8 - perform maneuver 1 | 9 - preform maneuver 2 | 10 - data to console

FreeForm Label: data to console — Print

```
1  Report " " to Console;
2
3  Report "SemiMajorAxis-Transfer orbit: ",SemiMajorTransfer, " km" to Console;
4
5  Report " " to Console;
6
7  Report "dv1: ",dV1, " km/s" to Console;
8
9  Report "dv2: ",dV2, " km/s" to Console;
10
11 Report "totalDV: ",totalDV, " km/s" to Console;
12
```

Line: 1 Column: 1 Offset: 1

Script Elements

- Block...End
- FreeForm
- Assign(=)
- Call
- Close
- For...End
- Get
- If...End
- Include
- Maneuver
- Open
- Pause
- Plot
- Put
- Receive
- Report
- Restore
- Save
- Send
- Show
- Step
- Stop
- Target...End
- Try...End
- Update
- View
- Watch
- While...End

Status Message: The Mission Plan executed successfully. | Status: Stopped | Run Duration: 1 s

ENG 9:26 PM 12/21/2023