

Geri+WS4 (FEM v4.3) BASED ON Hati+WS3 (FEM v4.2.1)

Updates for Geri+WS4 based on FEM v4.2.1 for Hati+WS3

1. Update the avionic battery location and weight; CONM2 9200@13002
2. Simply reduce the foam+cover weight for centerbody to match total weight
3. Update the weight for avionics cover in centerbody
4. Update the weight for body flap

Table 1 Comparison of mass properties for centerbody

Centerbody	Hati (FEM)	Hati (Test)	Geri (FEM)	Geri (Test)
Weight, lbs	7.458	7.413	7.355	7.313
IXX, lb-in ²	49.33	-	47.01	-
IYY, lb-in ²	545.68	-	505.0	-
XCG location, aft nose, inch	19.18	19.03	19.57	19.40

Simply increase the density for foam and cover for inner wing and outer wing from 0.005104 lb/in³ to 0.005304 lb/in³

Table 2 Comparison of mass properties for wings

Centerbody	WS3 (FEM)	WS3 (Test)	WS4 (FEM)	WS4 (Test)
Weight, lbs	2.99	3.00	3.056	3.058
IXX, lb-in ²	1198.27	-	1214.7	1196
IYY, lb-in ²	366.49	-	369.3	372.5
XCG location, aft nose, inch	28.80	28.81	28.83	28.5
YCG location, aft nose, inch	32.75	32.74	32.56	31.99

Integrate wing and centerbody for the full mode

Table 3 Comparison of mass properties for full model

Centerbody	Hati (FEM)	Hati (Test)	Geri (FEM)	Geri (Test)
Weight, lbs	13.78	13.76	13.77	13.76
XCG location, aft nose, inch	23.73	23.73	23.99	23.75
IXX, lb-in ²	9499.6	9560.0	9622	9360
IYY, lb-in ²	1656.2	1643.0	1594	1578.7

Table 4 Comparison of mode results

Mode	FEM v4.2.1 (Hati+WS3)	GVT (Hati+WS3)	FEM v4.3 (Geri+WS4)	GVT (Geri+WS4)	Diff. FEM v4.3 vs. GVT
SWB1	7.98	7.96	8.00	7.94	0.9%
AWT1	13.21	13.83	13.2	-	-
SWT1	16.50	15.97	16.7	16.1	4.3%
AWB1	19.44	19.22	19.38	18.54	4.5%
SWB2	31.44	31.90	31.40	31.22	0.5%
SWT2	41.96	39.60		-	

For FEM v4.3:

- 1) Symmetric wing considered
- 2) FEM mass properties match well with test article's mass properties except the total CG location;
- 3) Higher mode frequencies in SWT1 and AWB1

To run FEM updating program for FEM v5.1 for Geri+WS4 based on FEM v4.3

1. Update the avionic battery location and weight; CONM2 9200@13002
2. Update the weight for avionics cover in centerbody
3. Update body flap weight
4. Symmetric wing considered

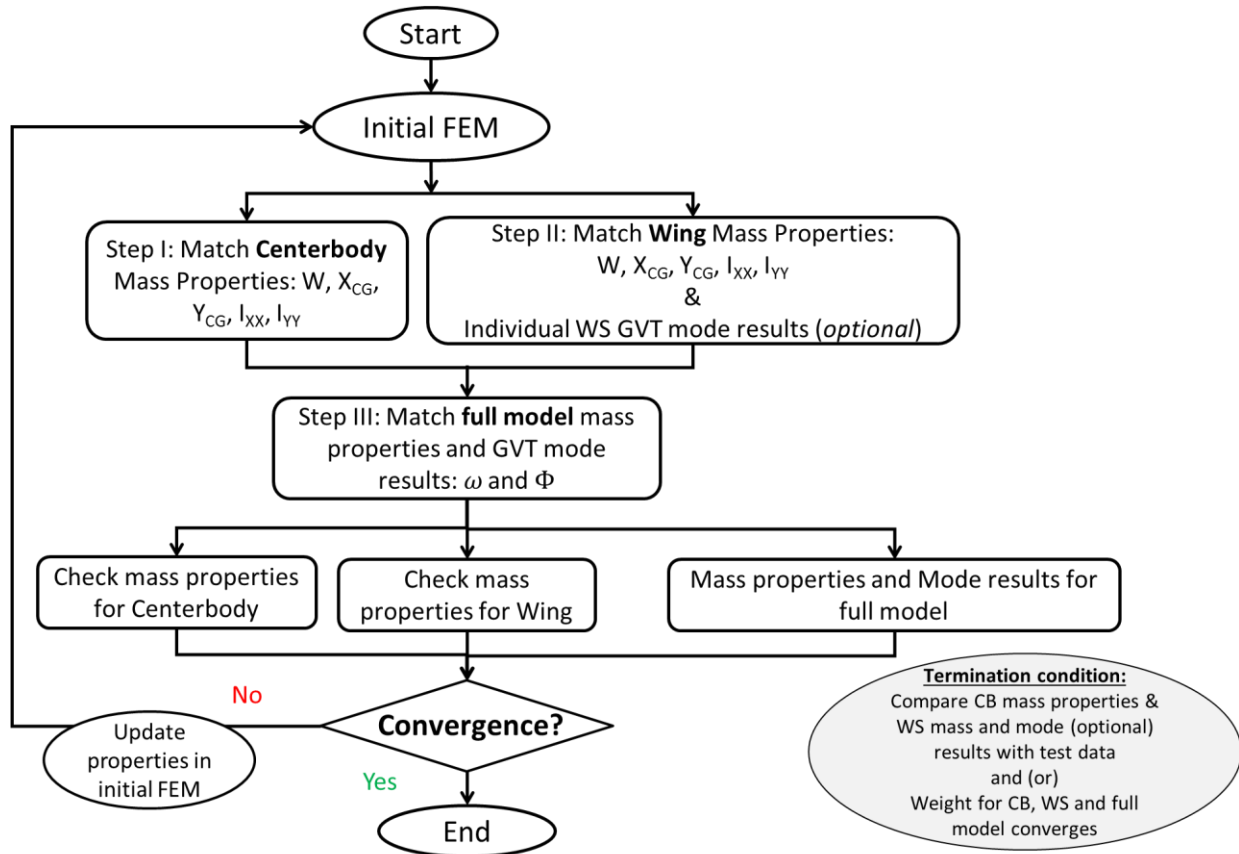


Figure 1 FEM update flowchart

Table 5 Comparison of mass properties for centerbody

Centerbody	Hati (FEM)	Hati (Test)	Geri (FEM)	Geri (Test)
Weight, lbs	7.458	7.413	7.323	7.313
IXX, lb-in ²	49.33	-	53.1	-
IYY, lb-in ²	545.68	-	511.1	-
XCG location, aft nose, inch	19.18	19.03	19.40	19.40

Table 6 Comparison of mass properties for wings

Centerbody	WS3 (FEM)	WS3 (Test)	WS4 (FEM)	WS4 (Test)
Weight, lbs	2.99	3.00	3.06	3.058
IXX, lb-in ²	1198.27	-	1209.8	1196
IYY, lb-in ²	366.49	-	366.2	372.5
XCG location, aft nose, inch	28.80	28.81	28.5	28.5
YCG location, aft nose, inch	32.75	32.74	31.99	31.99

Table 7 Comparison of mass properties for full model

Centerbody	Hati (FEM)	Hati (Test)	FEM v5.1 (FEM)	Geri (Test)	Diff.
Weight, lbs	13.78	13.76	13.77	13.76	0.0
XCG location, aft nose, inch	23.73	23.73	23.76	23.75	0.0
IXX, lb-in ²	9499.6	9560.0	9021	9360	-3.6%
IYY, lb-in ²	1656.2	1643.0	1584	1578.7	0.3%

Table 8 Comparison of mode results

Mode	FEM v4.2.1 (Hati+WS3)	GVT (Hati+WS3)	FEM v5.1 (Geri+WS4)	GVT (Geri+WS4)	Diff. FEM v4.3 vs. GVT
SWB1	7.98	7.96	7.95	7.94	0.1%
AWT1	13.21	13.83	12.5	-	-
SWT1	16.50	15.97	15.9	16.1	-1.2%
AWB1	19.44	19.22	18.7	18.54	0.9%
SWB2	31.44	31.90	31.5	31.22	0.9%
SWT2	41.96	39.60	37.9	-	-

Conclusions:

- 1) Mass properties for FEM v5.1 match well with test article's mass properties
- 2) Mode results for FEM v5.1 match well with test article's GVT results except one mode with frequency value, 9.2 Hz

