DARcorporation

Design • Analysis • Research

What's New in AAA?

Version 3.5

February 2013

AAA 3.5 contains various enhancements and revisions to version 3.4 as well as bug fixes.

Section 1 shows the enhancements and modifications made to AAA. Major enhancements include new modules and calculations. The second section contains bug fixes.

The AAA Manual describes the installation procedure and all modules. The manual is available in pdf format on the installation CD.

1. Enhancements and Modifications

Differences between AAA 3.5 and AAA 3.4 are:

1. Multiple segmented high lift devices can now be entered.
2. There is new option for Flap or Slat definition in the configuration dialog window
3. There is an additional Payload Reload mission segment option in weight sizing.
4. The 2D c_{l_α} is calculated at the flap mid span station.
5. $\Delta\varepsilon_{h_{\delta_f}}$ is renamed as $\Delta\varepsilon_{h_{o_{\delta_f}}}$.
6. Drooped aileron selection is now combined with the Flap/Slat dialog window.
7. Drooped aileron, slat and krueger flap deflections are shown in the “Angles” module under geometry.
8. Class II Inertias are calculated for structural components like wings, empennage, nacelles, fuselage etc.
9. Cranked wing geometry has a new module where the equivalent wing is based on the cranked wing mean geometric chord.
10. Wind tunnel scaling of stability & control derivatives is included in the stability and control module.
11. Multiple flap segments with different flap types can now be defined.
12. Change in wing maximum lift coefficient due to slats and Krueger flaps are now accounted for.
13. The coefficient in the wing weight equation for reference span is now 6.25 as it is in the Synthesis of Subsonic Airplane Design by Egbert Torenbeek.

2. Problem Fixes

This section lists problems found in AAA 3.4 and earlier versions, which are fixed in AAA 3.5.

2.1 Weight

1. Weight sizing regression plot scales have units of lb when scale options are opened by double clicking on the axes.

2.2 Aerodynamics

1. Gap effects are not accounted for elevons.
2. Trailing edge flap drag is not calculated if only drooped ailerons are defined.
3. Horizontal and vertical tail downwash gradients are the same with flaps down and flaps up for non-plain flaps.
4. $\Delta C_{m_{w_{LE}}}$ is incorrect when slats and krueger flaps are defined together.
5. AAA no longer limits the number of pylons to 10 in the analysis.
6. The GoTo button for the vertical tail wetted area causes an access violation error.

2.3 Performance

1. Performance sizing max cruise speed calculation and matching plot should use propeller efficiency.

2.4 Geometry

1. Straight tapered methods are missing for a V-tail configuration.
2. On a new file, fuselage geometry gives an warning about not all data being defined even when all data is defined.
3. In fuselage geometry, if the last section is the largest cross section and error message is shown saying the table is incorrect.
4. The fuselage cross sections are not centered about the Y-axis in the cross section display window.
5. The body cross sectional areas are slightly incorrect if the conic farthest from the Z-axis has a rho value greater than 0.98.
6. The program checks for operating engines when plotting the airplane 3-view.
7. Nacelles, tailbooms, floats and stores are defined by projected angles.
8. Airplane 3-view will now plot fuselage if no lifting surface data is defined.

9. Vertical Tail geometry parameters are not calculated correctly
10. Floating point error occurs if the Y-location of the last panel's root is on the lifting surface tip.
11. There are no checks in the software to see if a lifting surface is forward of the fuselage nose if attached to the fuselage.
12. Vertical Tail geometry parameters are not calculated correctly if the Z-location of the apex is not zero.
13. There are no methods implemented for the width of the fuselage in the region of the lifting surfaces but the variables are shown as output variables.

2.5 Propulsion

No Changes

2.6 Stability and Control

1. C_{y_p} module button click does not ask for aileron or elevon defined.
2. C_{m_q} module shows f_{gap} only for ailerons and not for elevons.
3. C_{y_p} module shows f_{gap} as an input even if no ailerons are defined.
4. C_{l_p} module shows f_{gap} as an input even if no ailerons are defined.
5. $C_{l_{\beta_{vee}}}$ and C_{l_β} are not calculated for a V-tail configuration if data is entered from scratch in the C_{l_β} window.
6. Not all output is calculated in the C_{m_u} module even when all data is entered from scratch in the C_{m_u} window.
7. The labels on the α lines are incorrect in the Trim Diagram causing a floating point problem.
8. w_{f_h} is shown as an input in the C_{m_α} module even though it is indicated that the horizontal tail is not attached to the fuselage.
9. There is a floating point error in the wing location module if the wing travels aft of the vertical tail.

9.4 Dynamics

No Changes

9.5 Loads

No Changes

9.6 Structures

No Changes

9.7 Cost

No Changes

9.8 General

1. The number of decimals in the legend now matches the variable output window