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What's New in AAA?

Version 3.0 Service Release 1

September 2005

DARcorporation is proud to announce the release of **Advanced Aircraft Analysis (AAA), Version 3.01**. This service pack contains various enhancements and revisions to version 3.0 as well as repairs to unforeseen bugs. AAA 3.01 now has over 260,000 lines of code and over 4,000 variables.

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

A module-by-module overview of the differences between AAA 3.0 and AAA 3.01 is listed below.

1.1   Weight

1. Ventral Fins were added to this module.
2. Definitions for the Cessna, USAF, Torenbeek, and GD methods were added to the theory for Class II weight module.
3. Added a range macro for the fraction of fuel tanks which are integral (wet wings) or wings which have a bladder or tank.
4. Added details on how wing, horizontal tail, canard, V-Tail, vertical tail, tailboom, nacelle, and fuselage center of gravity are calculated in the help system.
5. Class I inertia module: The gross weight now uses the current weight versus manually entering the value in.
6. The variable, hpcabin, is now removed from the Class II weight, Fixed Equipment, Furnishings module when the aircraft is selected as non-pressurized.
7. Recommended values for F_{cg_f} added to help for component CG.

1.2   Aerodynamics

1. Ventral Fins were added to this module.
2. Critical Mach number was expanded and now includes pylon critical Mach number.
3. A warning message now occurs if the span-wise flap outboard station overlaps or is more than the aileron inboard station.
4. A warning message now occurs if "Power Effects" is selected with a jet aircraft defined: only available for propeller driven airplanes.
5. α_o for root and tip on all surfaces at Mach number and altitude is now an output.
6. Added a nacelle fuselage interference factor of 1.0 for wing attached nacelles.

1.3   Performance

1. Details of Specific Excess power for military aircraft added to the help system.
2. Details of Balanced Field Length added to help for Performance/Analysis/Takeoff Distance/Balanced Field Length.

1.4   Geometry

1. A warning message occurs when the Mach number exceeds 1.0 in the horizontal/vertical tail volume coefficient module.
2. A "Never Show This Again" checkbox added to the AeroPack module.
3. The column spacing in the pylon AeroPack module is increased to fit the corresponding field names.
4. There are now geometry plots for the tabs on control surfaces.

1.5   Propulsion

No Changes

1.6   Stability and Control

1. The lower limit of the elevator to horizontal tail chord ratio has been removed.
2. α' added to Trim Diagram and line is plotted.
3. A message occurs when the horizontal tail trimmed lift iteration is complete.
4. c_{l_α} for root and tip on all surfaces at Mach Number and altitude is now an output.
5. Added theory for Static Margin.
6. Longitudinal Trim allows for use of Class II Drag polar.

1.7   Dynamics

No Changes

1.8   Loads

No Changes

1.9   Structures

No Changes

1.10   Cost

Cost Escalation Factor (CEF) is updated through July 2005.

1.11   General

1. Class II drag now takes into account trim tab drag on all control surfaces.
2. Engine/Nacelle placement is now a selection in the Engine Configuration window.
3. Fixed problem with vanishing decimals when the help window covers the input or output values.
4. More tips were added to AAA helping the user operate the program more efficiently.
5. Revamped exporting tables from AAA to avoid loss of existing files and work. Necessary warning messages are displayed in event of an error.
6. The "Recalculate All" feature was revamped and now includes options for lateral tip-over and critical Mach number recalculation.
7. The trim diagrams and plots output by the "Recalculate All" feature and trim plots now include the full name of the flight condition in the diagrams for easier reference.
8. Changed the legends on the trim diagrams to represent lines.
9. The mouse-over pop-up hints stay open longer giving the user more time to read them.
10. When exporting all parameters, the save-as dialog box opens first, eliminating delays.

2. Bug Fixes

This section list all the bugs found in AAA 3.0 and earlier versions which are fixed in AAA 3.01.

2.1   Weight

1. Class II Weight: Problems with exporting the tables and plots in empty weight under center of gravity have been fixed.
2. The data in the Class I Weight Fractions Weights table remains after closing the window.
3. The regression coefficients for UAV aircraft in the weight sizing module are updated.
4. The factor for calculating wing C.G. for sweep angles of less than two degrees was 0.4/100 instead of 0.4: bug fixed.

2.2   Aerodynamics

1. The Mach Drag Divergence number from Class II drag did not match the Mach number calculated from the Critical Mach number.
2. In the help graphic for Class II windshield drag, CDfus = 0.078, not ΔCDfus = 0.078.
3. AAA no longer calculates inlet drag for pistons and turboprops.

4. The "Recalculate All" option in Class II Drag will no longer recalculate flap and leading edge devices for transonic and supersonic regions.

5. C_{L_α} for pylons at transonic speeds should use the actual t/c, instead of t/c = 0.0.

6. In the Aero. Center Module, Power Effects are not valid for jets and the module cannot be accessed with a jet airplane defined.

7. Aerodynamic twist was incorrect for t/c < 6%. The Mach number correction for zero-lift angle of attack of cambered airfoils is now set at 1.0 for thickness ratios less than 6%.

2.3   Performance

No Changes

2.4   Geometry

1. The user can now input a pylon taper ratio greater than '1' for the AeroPack Pylon module.

2. The span dimensions on the help graphic for a rudder with shielded, unshielded, and partially shielded horn have been corrected.

3. Fixed the problem with unit conversion when importing tables in the AeroPack module.

4. The equation for sweep angle in the help graphic for vertical tail sweep angles was changed from 4/AR to 2/AR.

2.5   Propulsion

No Changes

2.6   Stability and Control

No Changes

2.7   Dynamics

No Changes

2.8   Loads

Concentrated loads: when all components are defined, the total internal structure selected and a checkmark for concentrated loads, a warning message was incorrectly occurring.

2.9   Structures

No Changes

2.10   Cost

No Changes

2.11   General

1. Fixed display problems with the flight condition window with 1024x768 resolution.
2. In the work pad, the conversion between meters and millimeters was incorrect and is now fixed.
3. Problem with exporting all parameters is fixed.
4. Problem with switching Flight Condition dependent variables to independent fixed.