RESEARCH IN FLIGHT

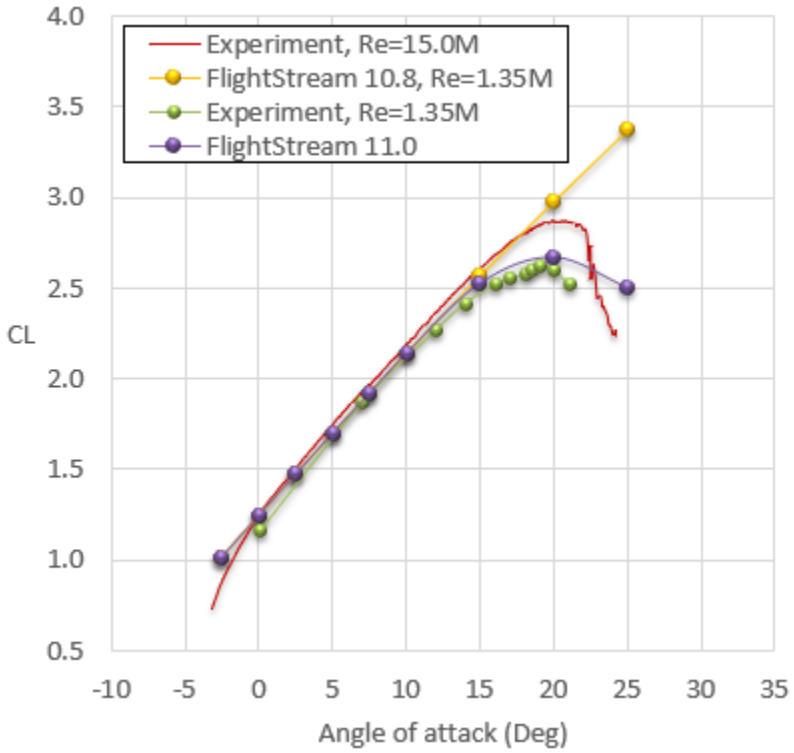
FlightStream 11.0

Release Notes

Release Features

Stall prediction, CL_{MAX} and non-linear aerodynamics

A powerful new feature in FlightStream® 11.0 is the solver's new ability to compute flow separation on the geometry. The onset of Flow separation is computed using an innovative, and breakthrough approach in surface vorticity, allowing the solver to predict reduced lift forces as a result of increasing flow separation. This generates non-linear aerodynamic loads and culminate in the accurate capture of stall and post-stall loads. The solver computes all of this using the computed surface vorticity, thereby generating these stall results without affecting solver run times at all. An example result is shown here for the AIAA High-Lift Prediction Workshop-2 geometry:

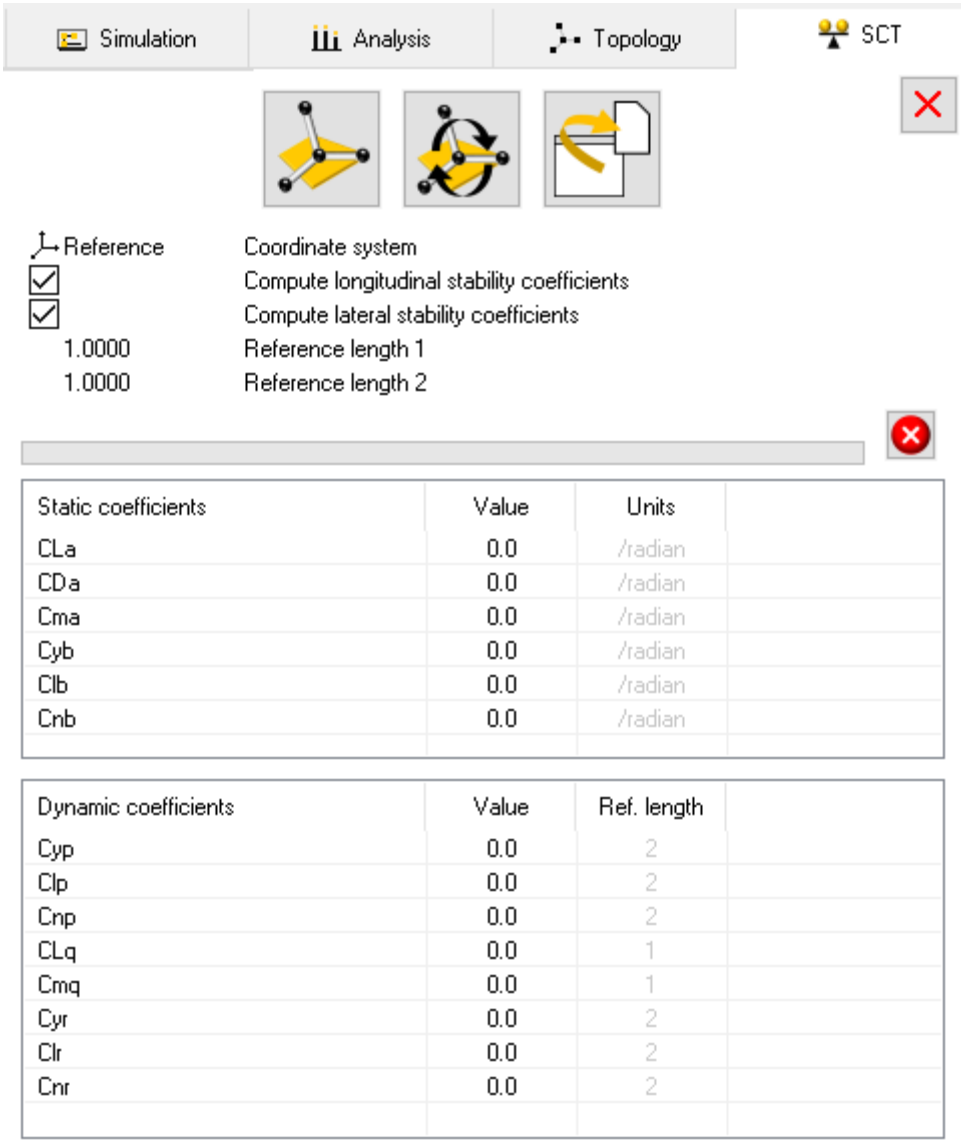


Laminar/Turbulent boundary layer transition

Another new feature in FlightStream® 11.0 is the ability to compute viscous loads for transitional flows. Earlier versions of the software used the implicit assumption for fully-turbulent flow in their viscous computations. The new version allows users to enable laminar flows with transition to turbulent flow, allowing for more accurate capture of viscous forces on these type of geometries. This is particularly useful for geometries that specialize in maintaining laminar flows for portions of their surfaces.

Stability & Control Toolbox

FlightStream® now has the ability to compute lateral and longitudinal static and dynamic stability coefficients with the aid of a simple-to-use toolbox. Open the toolbox, click the button to generate the stability coefficients, and generate a spreadsheet of results. FlightStream® automatically computes the steady and unsteady solver results via the toolbox, so you don't have to set up complex runs.



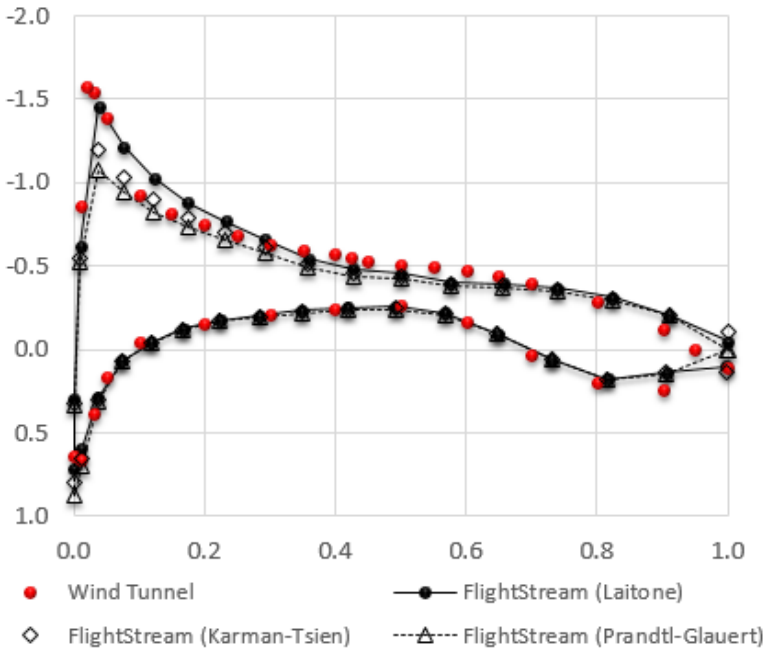
Advanced CAD repair capabilities

FlightStream® now features advanced CAD generation and repair capabilities. These include the ability to clean up small faces, agglomerate faces for clean anisotropic surface meshes, topology cleanup, sewing and intersecting surfaces, etc. The user can now input a "dirty" CAD model and clean it up easily before generating a clean surface mesh for the solver. Detailed documentation for these features and tutorials have also been created. Please contact your FlightStream® support representative for details on these tutorials.

Enhancements

Higher-order compressibility models

FlightStream® 11.0 allows users to now use higher-order compressibility models to better capture pressure distributions for high subsonic Mach numbers. The default first-order Prandtl-Glauert (applicable up to Mach 0.4) compressibility model has been augmented by the new second-order Karman-Tsien (applicable up to Mach 0.5) and the second-order Laitone (applicable up to Mach 0.8) models. The user can now choose their higher-order compressibility models in the solver settings. An example is shown here for the DLR-F4 geometry wing cross-section in highly compressible freestream Mach number of 0.6.



Improved moments computation

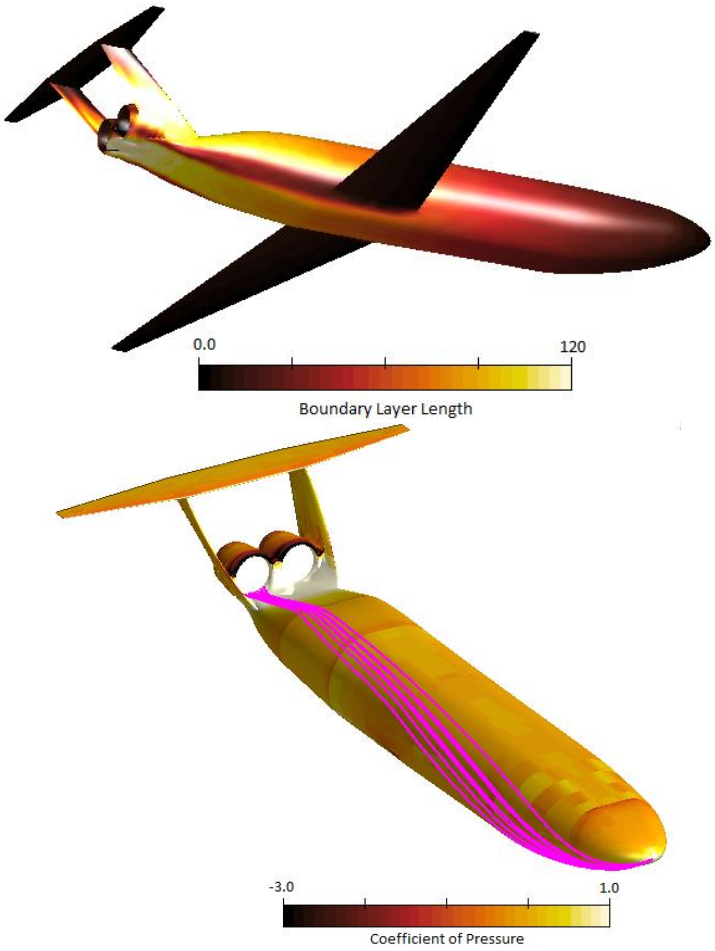
FlightStream® 11.0 has enhanced models for computing aerodynamic moments in the presence of actuators (propeller and/or jet exhaust). Version 11.0 therefore generates better moment results for geometries using these actuators. Ask your FlightStream® representative for details on these enhanced results.

New freestream velocity distributions

FlightStream® 11.0 has enhanced options for the freestream velocity distributions. In addition to the existing constant and rotational (moving reference frame) freestream velocity distributions, a shear velocity distribution has also been added. This allows users to import a custom velocity distribution for the shear function. Applications of this feature include the modeling of atmospheric boundary layer on geometries such as wind turbines etc.

Automated surface streamlines for viscous loads

Another enhancement to the viscous loads computation has been the addition of automated surface streamlines for the solver. These surface streamlines are computed for every face on the mesh and are used to compute detailed boundary-layer distributions that are then used to compute the viscous forces and the onset of flow separation.



New CAD Repair options

FlightStream® 11.0 features new CAD repair options added on to existing functions. Examples include automated vertex removal in groups, splitting CAD curves using exterior vertices, CAD surface healing and creating untrimmed CAD faces out of existing trimmed CAD faces.

Updated scripting API

The scripting API has been updated to allow access to all of the new features and enhancements for FlightStream® 11.0.

Fixes

Improved CAD import robustness

FlightStream® 11.0 features increased robustness with CAD import, including robust parsing of units, scaling and naming hierarchy. This has allowed FlightStream® 11.0 to allow importing of CAD models without user settings or interactions. Point to a CAD file on your machine and import.

Geometry face orientation issues

FlightStream® 11.0 has fixed geometry orientation issues associated with CAD models that have mismatched face orientations. The new version performs robust orientation checks on the geometry transferred from CAD, allowing users to ignore any face orientation issues with their meshes.

Improved robustness in CAD-based meshing

FlightStream® 11.0 features numerous minor bug fixes and minor enhancements (automations) to make the new meshing process with CAD models increasingly lightweight for the user. This version features allows new users to quickly and interactively mesh their CAD models within seconds and push through to the solver runs.

Miscellaneous bug fixes

FlightStream® 11.0 features many minor fixes to bugs reported with version 10.8.

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