FLIGHTSTREAM®

FAST AERODYNAMICS WITH FIDELITY

Version 2020.1

RELEASE NOTES

NEW FEATURES

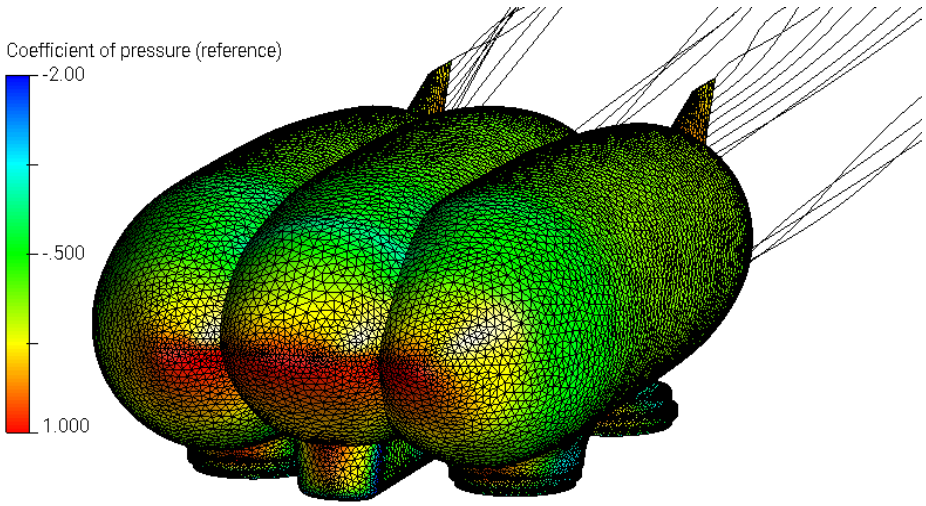
FASTER. LEANER. HIGHER-FIDELITY.

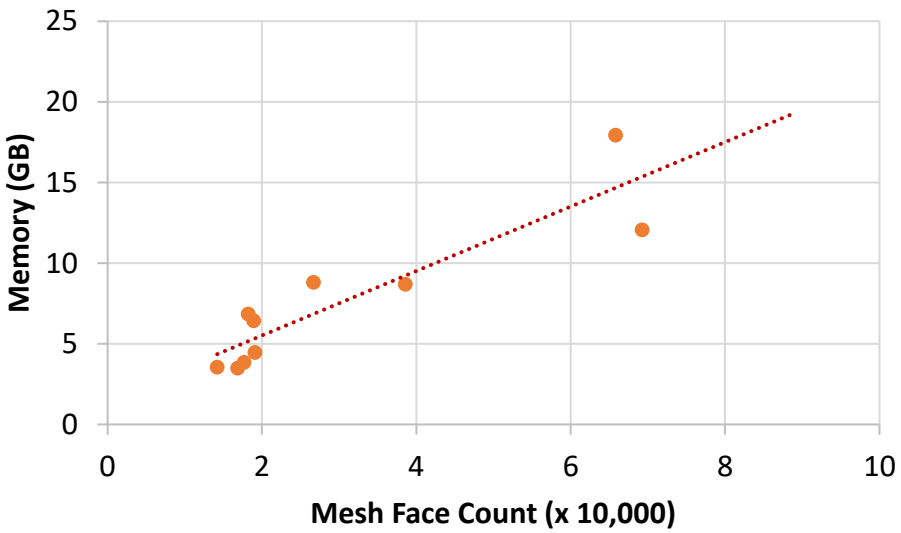
FAST MULTIPOLE SOLVER

The Fast Multipole Method (FMM) has finally been added to FlightStream®, allowing a breakthrough of the mesh face count limitations on the solver. The addition of FMM substantially reduces the memory footprint of the solver to allow each additional 10,000 mesh faces to be added for an additional 2 GB of machine memory (as seen in the Figure below). This means that you can now run mesh sizes of 100,000 triangles/quads for about 20 GB of memory, which is well within standard CFD workstations. Consequently, the use of unstructured CFD surfaces are now readily usable within FlightStream® up to 250,000 triangles/quads.

LARGE CFD MESHES

EXTREMELY FAST





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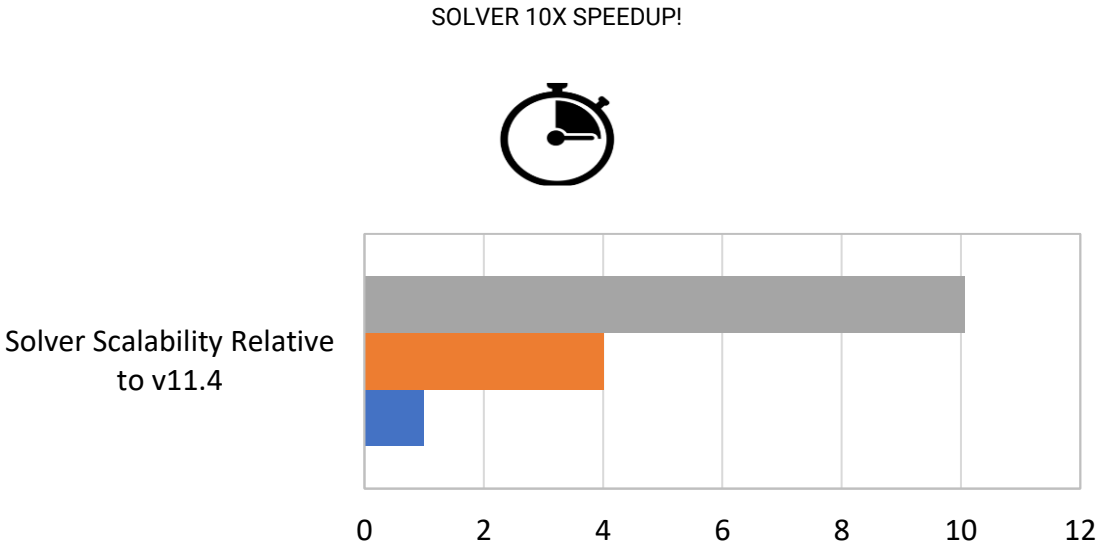
FAST SOLVER

FlightStream® 2020.1 solver also features substantial speedup enhancements. These enhancements to the memory management of the automated wake algorithm and Fast Multipole Solver allow for a solver that is now 4x faster in standard mode (without Fast Multipole) and up to 10x faster for the Fast Multipole mode.

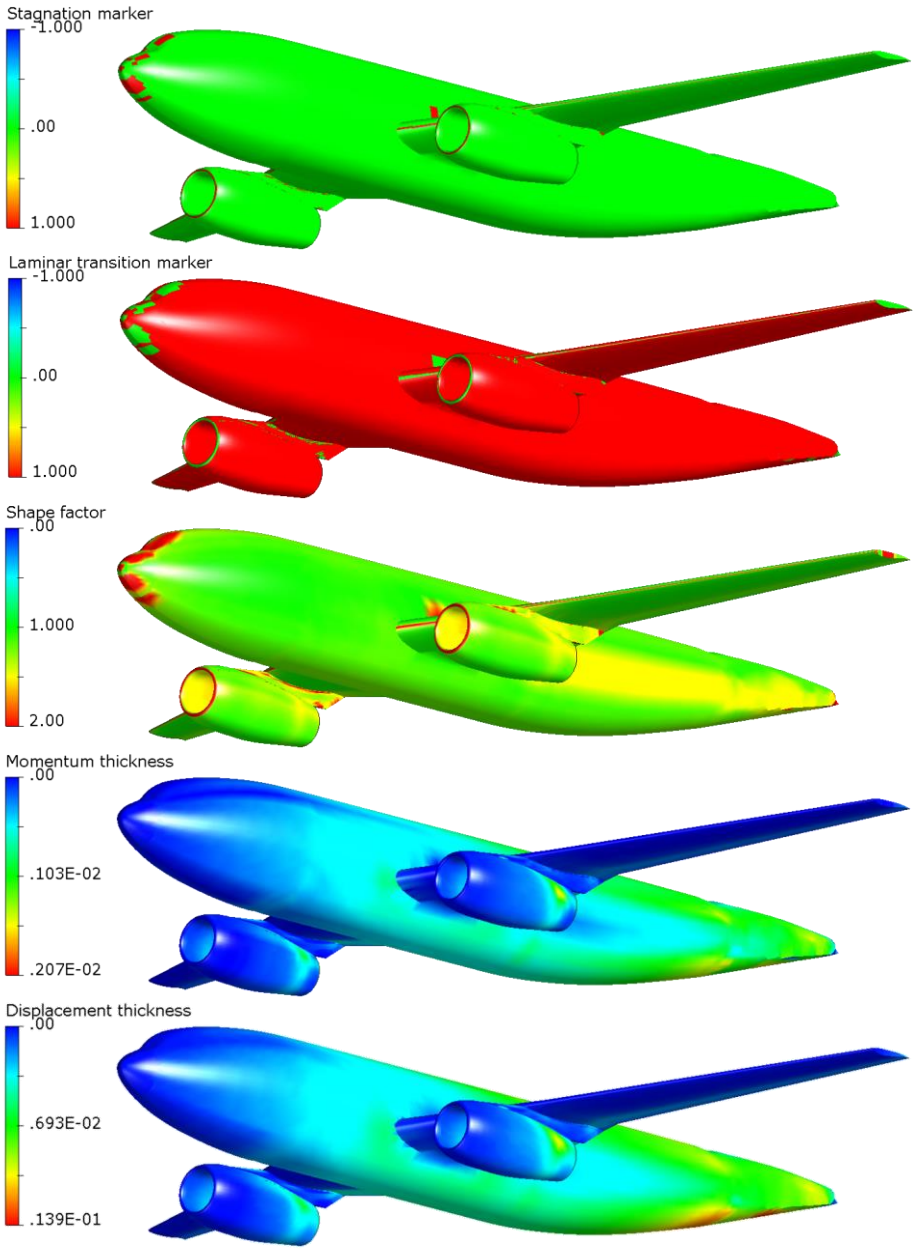


	Solver Scalability Relative to v11.4
2020.1 (Fast Multipole)	10.07
2020.1 (Standard)	4.01
2019.2 (11.4)	1.00

FAST SOLVER

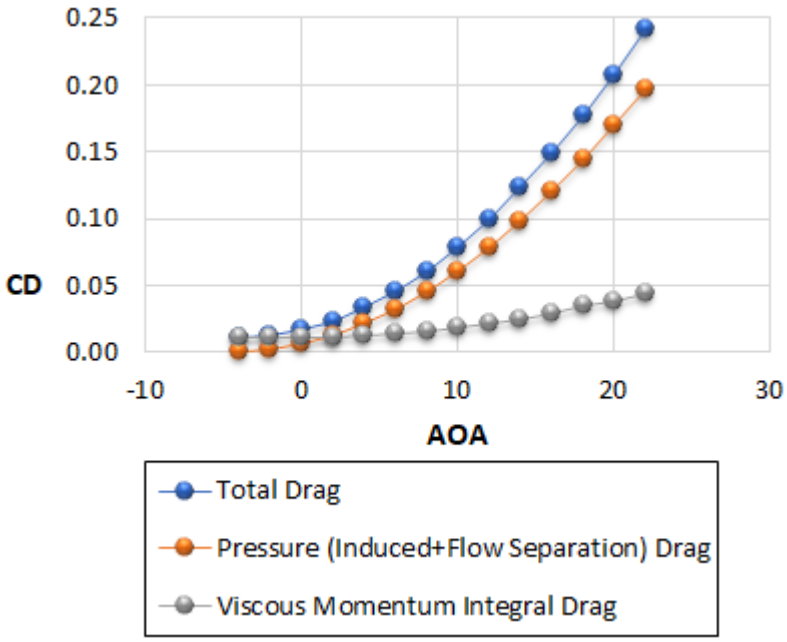
New field parameters have been added to the graphical mode in FlightStream ®, allowing users to visualize the viscous Integral Boundary Layer through the following new parameters:

- STAGNATION MARKER
- TRANSITION MARKER
- SHAPE FACTOR
- MOMENTUM THICKNESS
- DISPLACEMENT THICKNESS



NEW VISCOUS DRAG MODEL: BOUNDARY LAYER MOMENTUM INTEGRAL

A powerful new feature in FlightStream® v2020.1 is the addition of the new Momentum Integral model for the computation viscous drag forces in the solver. In addition to the existing "Reynolds Averaged" model available from the previous version, the new option allows users to compute viscous drag forces and moments directly using the Integral Boundary Layer models available. This model applies a Coles near-wall velocity profile to the available boundary layers to compute viscous drag forces. Consequently, this new model is able to compute the large increases in viscous drag forces at higher incident angles, as shown below for the DLR-F4 geometry at Mach 0.6.



FORCE DISTRIBUTIONS EXPORT FILE

A new file export option has been added to FlightStream® v2020.1 to allow export of per-component force distributions. This option is in addition to the existing pressure and PLOAD export formats for FEA tools, but works similarly to allow users to export force distribution plots for customized analysis.

NEW COORDINATE SYSTEMS ROTATION TOOL

FlightStream® v2020.1 now allows users to rotate custom coordinate systems about their own axes, or about any other coordinate system axes. This tool enables the motion of coordinate systems to match changing geometry requirements, such as transitioning VTOL wings with nacelle-mounted user-defined coordinate systems for the propeller actuators.

ENHANCEMENTS

COPY/PASTE SPREADSHEET DATA

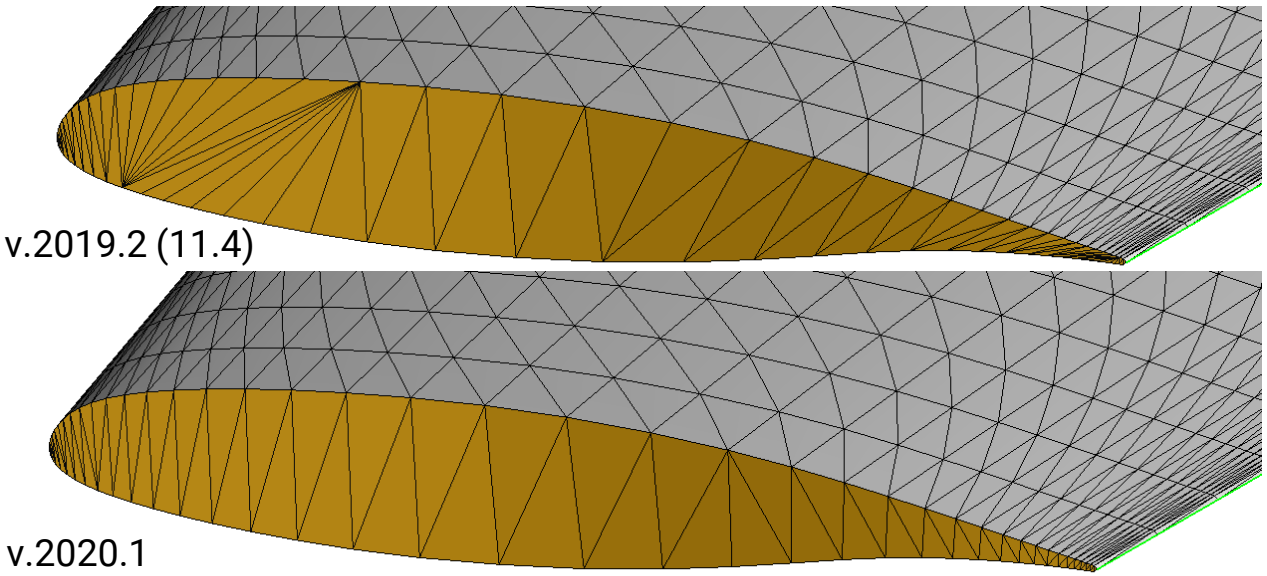
FlightStream® v2020.1 allows users to right-click on the Solver Sweeper computed spreadsheets in the FlightStream® user-interface and copy the data columns for pasting directly into Excel Spreadsheets. An additional export option has also been added to allow users to copy/paste the entire spreadsheet to the clipboard for pasting either in Microsoft programs, or other data analysis spreadsheet software. This capability is now available as an additional interactive option to the ability to export text files with the spreadsheets.

ENHANCED MESHING QUALITY

FlightStream® v2020.1 substantially improves the mesh quality of the unstructured surface meshes generated in the FlightStream® CAD. Users will now substantially improved triangle/quad mesh quality, far-reduced topological problems for severe concave regions, and improved meshing speeds.

ENHANCED MESH HOLE FILLING

FlightStream® v2020.1 has an improved mesh hole-fill tool that generates substantially better-quality hole-fill triangles, allowing users to dispense with post-fill cleanup. An example is shown below.



UPDATED SCRIPTING A.P.I.

The scripting API has been updated to allow access to all new features and enhancements for FlightStream® 2020.1 described in this document.

FIXES

SEMPER CRESCIS

MESH DIAGNOSTICS ON NON-DEGENERATE FACES ONLY

Mesh Diagnostics now only run on non-degenerate mesh faces, thereby reducing the overall statistics of mesh quality issues reported in the Topology pane of the software.

MISCELLANEOUS BUG FIXES

FlightStream® 2020.1 features many minor fixes to bugs reported with version 2019.2 (previously version 11.4).

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