

CAPS Muddy Cards for Sessions 07 and 08

ESP v1.22

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1. Q. Is there any possibility for including other aim inputs, specifically for AVL? What comes to mind is the CLscaling quantity that can be set for a given section to scale the local dCLdalp to account for things like thickness.
A. We are always looking for feedback to improve ESP/CAPS. We are often willing to work with anyone with requests for improvements. ESP is also available as open source, and anyone can make their own improvements. We always appreciate if such improvements are shared with us so they may be distributed to the wider community.
2. Q. How do you control which component directs the mesh imprinting? For this example, why did the engine nacelles not get the coarse mesh of the wing? (session 7, slide 11)
A. The finer mesh always imprints and refines the coarser mesh, and this goes two ways. In the example, the finer mesh on the leading edge of the nacelle imprinted on the wing, but the finer mesh on the trailing edge of the wing imprinted on the nacelle.
3. Q. What does the scaleFactor affect? The Mesh_Length_Factor? The ref_len?
A. The scaleFactor is applied to scale ref_len locally for a FACE/EDGE.
4. Q. Will there be any benefit to use proximity for two adjacent components/bodies such as wing-fuselage?
A. No. The proximity detection only looks at faces that are not connected logically via shared EDGES.
5. Q. Does proximity detection turn on automatically or do you have to turn it on?
A. Proximity detection is always enabled between distinct bodies. For a single body it is only enabled by tagging FACES with AFLR4.Cmp_ID.
6. Q. Is it possible to link a surface mesh generated through some external tool?
A. The better solution is to put together an AIM for a new mesh generation.
7. Q. Will parameters set with Mesh_Gen_Input_String override what's set via caps, e.g., boundarylayerspacing?
A. Yes. The Mesh_Gen_Input_String is set after all the AIM inputs. However, it's best to use the exposed AIM inputs and only use Mesh_Gen_Input_String for options not exposed.
8. Q. In the slides/example files, you have for the input.Mesh_Sizing “boundaryLayerSpacing” and “boundaryLayerThickness”, but in the aim documentation, there is BL_Initial_Spacing and BL_Thickness. Why are these different?
A. BL_Initial_Spacing and BL_Thickness are global boundary layer parameters applied to all faces. The Mesh_Sizing input sets face local boundary layer parameters via the capsMesh attribute.
9. Q. Is it possible to use embedded body for local mesh refinement, e.g. refine wake region?
A. Yes. The faces should be tagged with AFLR_GBC TRANSP_UG3_GBC.
10. Q. Are geometric sensitivities able to be computed at the vertices of an AFLR4 mesh?
A. Yes. This is handled automatically internally to CAPS.
11. Q. What's the benefit of making the C_L output a functional / dynamic output? Could we have just grabbed C_L as a regular output?
A. For Cart3D and Fun3D, derivatives are only computed for functionals specified by the Design_Functional input.

12. Q. If the mesh has to be rebuilt for Fun3D, why is AFLR not included in the optimization process?
- A. AFLR is included in the in the example python script for the shape optimization with Fun3D, but it was not shown in the slides. The AFLR4/AFLR3 AIMS are executed automatically when `fun3d.preAnalysis()` is executed.
13. Q. How can the noise of remeshing can be minimized?
- A. For Fun3D, using mesh morphing should help reduce noise in the objective function value and its gradients.