



Fluent Meshing功能介绍及演示

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FLUENT MESHING 应用定位



FLUENT MESHING 使用流程及重要功能



案例演示

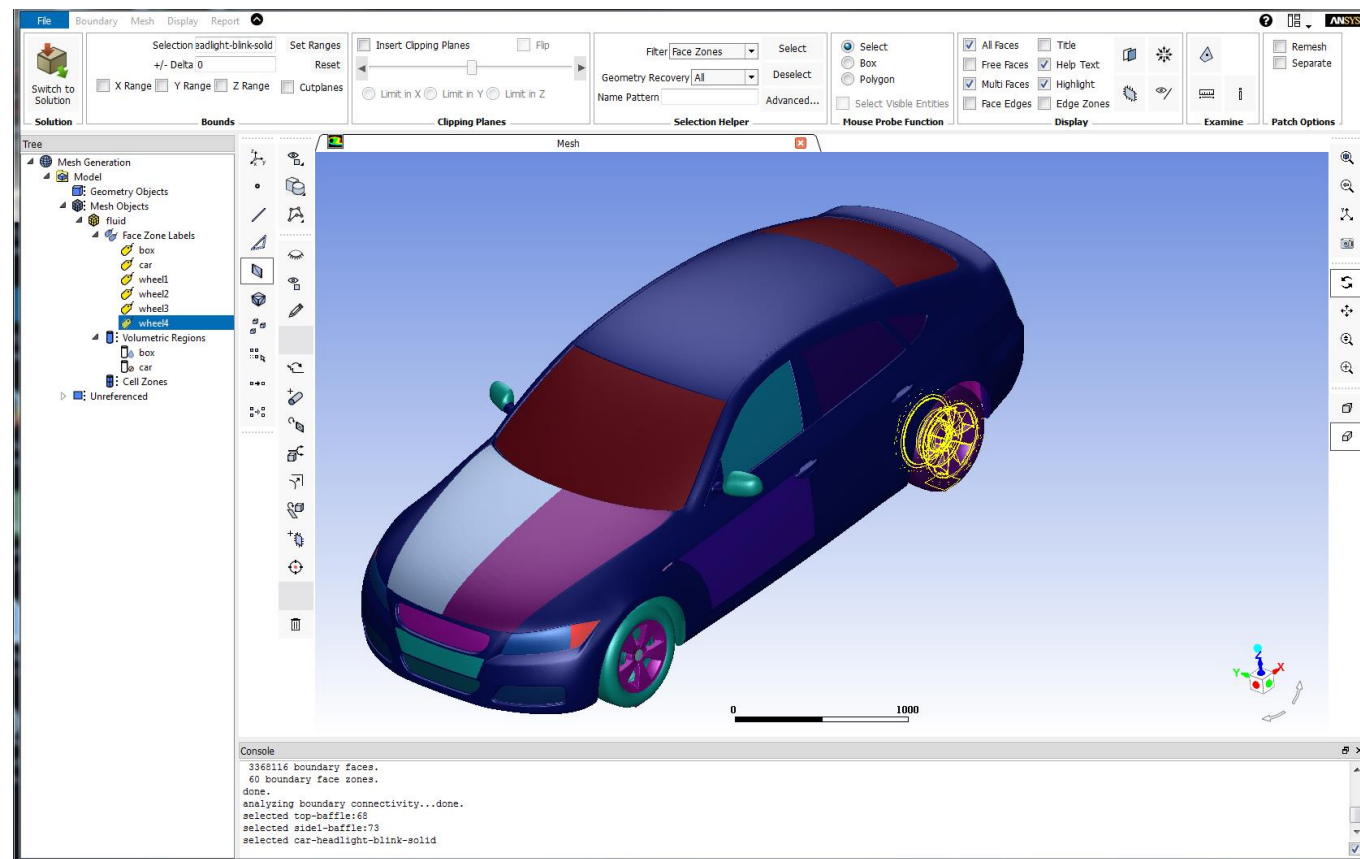
- “干净” 几何模型划分流程
- “脏” 几何模型划分流程

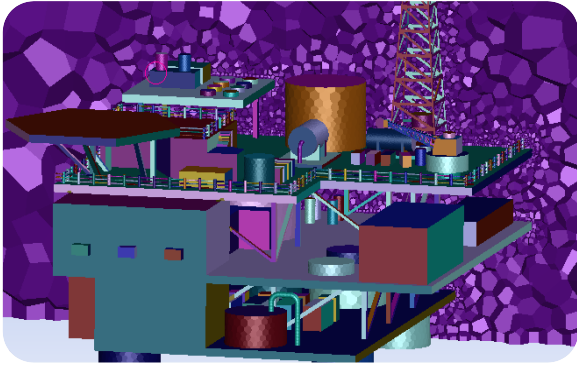


Q&A

Fluent Meshing

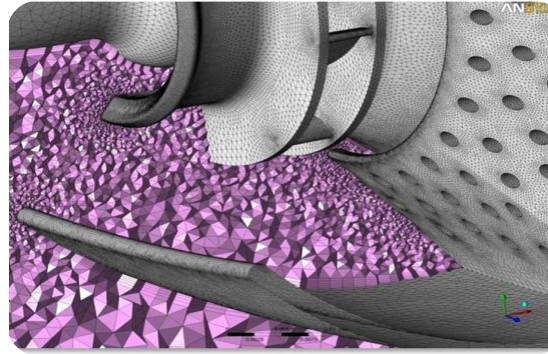
- ✓ 完整集成于FLUENT操作环境中
- ✓ 基于TGRID 底层网格生成算法
- ✓ 包含从CAD导入到体网格生成的完整流程
- ✓ 基于拓扑结构的模型树管理，
使用鼠标完成大部分交互
- ✓ 可以生成大规模高质量的混合类型体网格
- ✓ 支持批处理脚本运行，对于处理大规模网格
模型效率更高





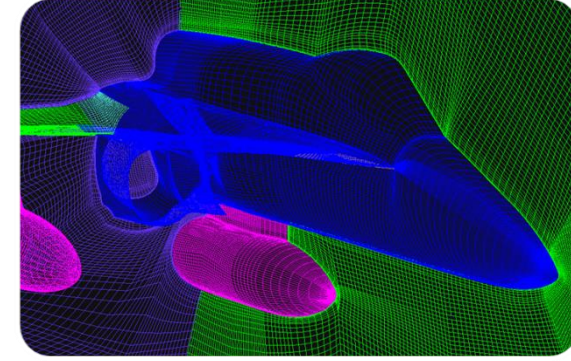
Fluent Meshing

- 非结构化网格生成工具
- 支持脚本批处理
- 大规模网格快速生成工具
- 适用于复杂及缺陷较多的几何模型



WB Meshing

- Workbench集成
- 自动网格生成工具
- 适用于多个求解器
- 对于中等复杂程度模型适用



ICEM CFD

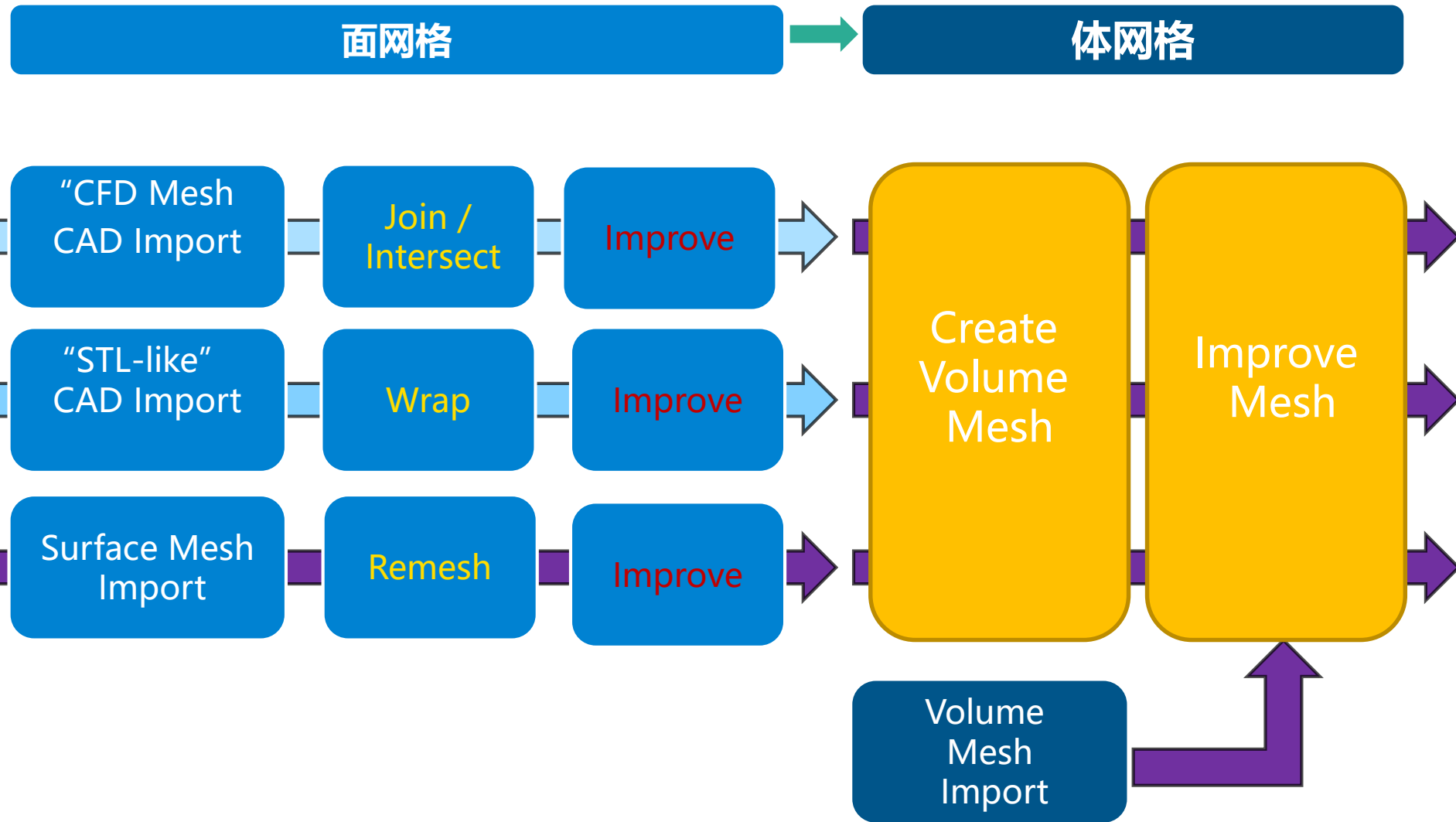
- 特色：六面体block
- 对于简单模型更合适

Shared Libraries

CFD

Multiphysics

CFD & Mechanical



CAD模型导入及重构

- 根据表面质量及拓扑完整性可以按照不同类别进行管理

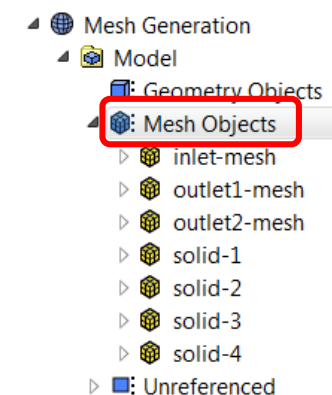
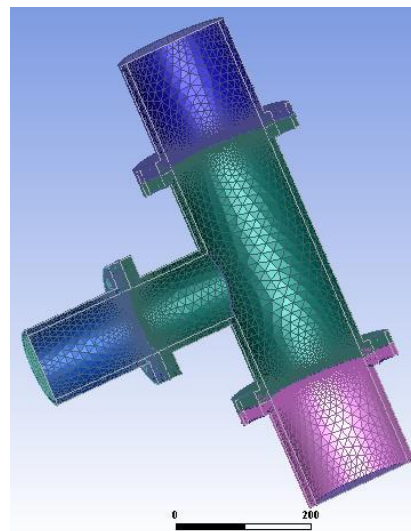
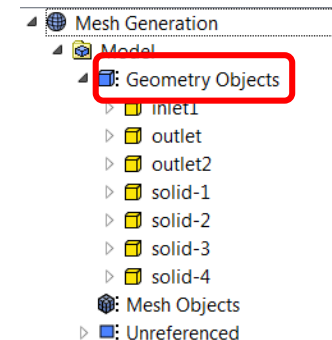
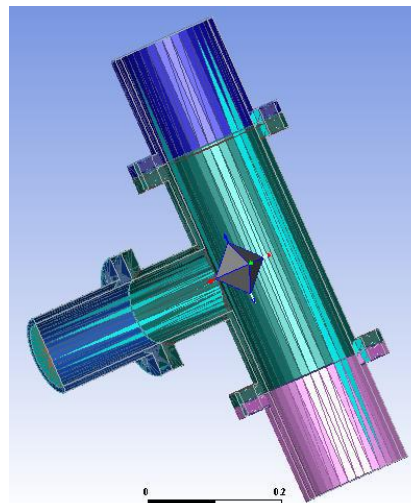
- **Geometry Object**
表面网格质量较差

拓扑结构不完整

- **Mesh Object**
已经解决了拓扑完整性及表面网格质量问题

可以作为后续网格划分流程的输入

- 两种对象之间可以相互转化



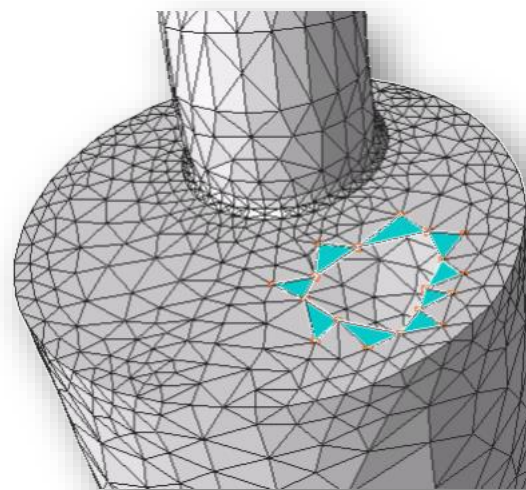
表面封闭性及连接关系检查

自动诊断问题



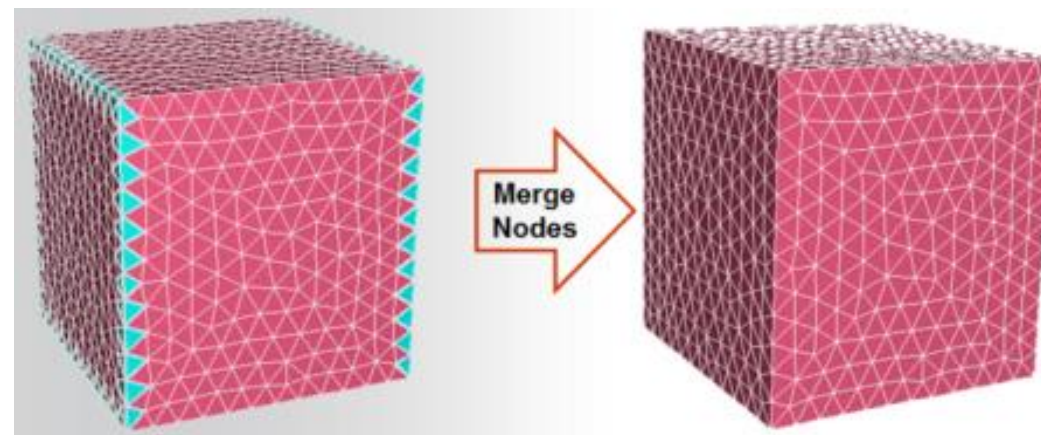
选择处理方法

Issue	Operations
☒ Free	☒ Merge Nodes
☐ Multi	☐ Stitch
☐ Self Intersections	☐ Delete
☐ Self Proximity	
☐ Duplicate	Options
☐ Spikes	☒ Relative (Percent)
☐ Islands	Tolerance 10
☐ Steps	Apply for Current
☐ Slivers	Apply for All
☐ Point Contacts	



☒ All Faces	☐ Title
☒ Free Faces	☒ Help Text
☐ Multi Faces	☒ Highlight
☐ Face Edges	☒ Edge Zones
Display	

破洞



非共节点

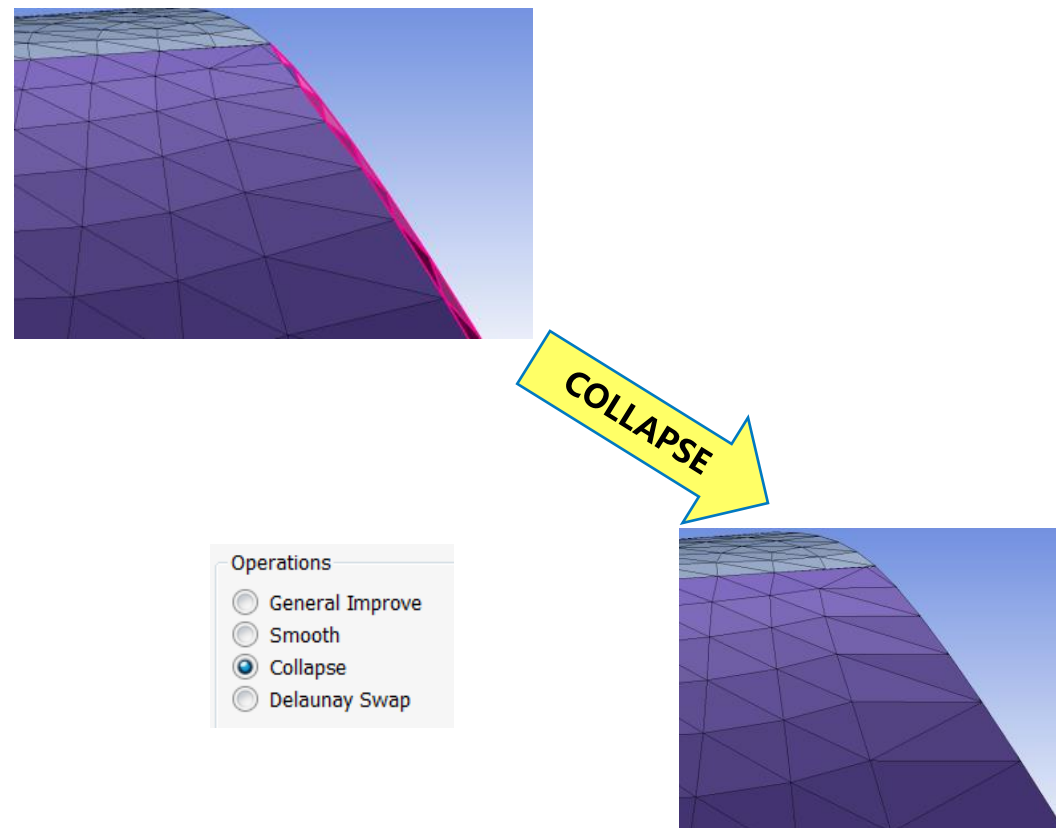
网格质量检查及优化

➤ 一般性光顺

- 不改变模型外形特征
- 适用于面网格质量较高情况下的优化

➤ 塌陷(合并节点)

- 改变模型外形特征
- 可以大幅改善网格质量



尺寸函数-曲率及逼近

➤ 曲率尺寸函数

- 检查边或面上的曲率
基于网格的法线夹角要求进行网格细化

➤ 逼近尺寸函数

- 检测所选的边/面之间的邻近性(proximity)

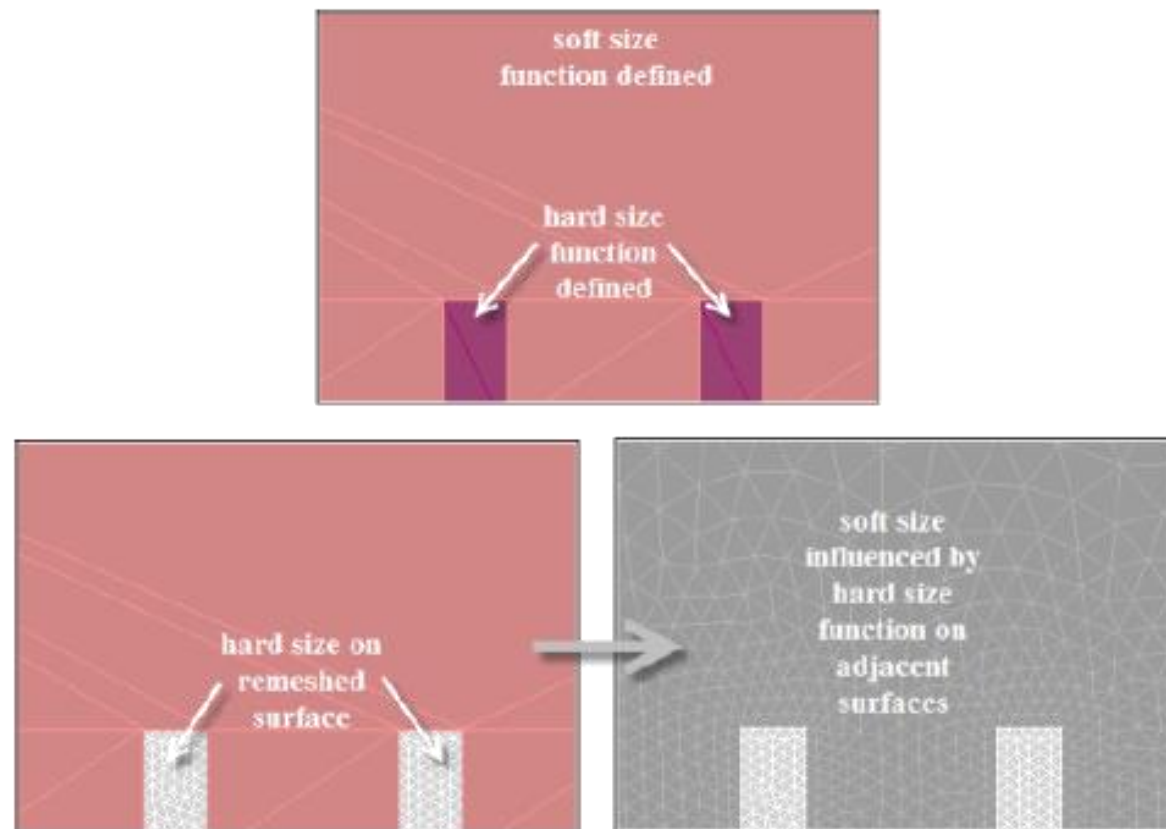
对其加密直至用户指定的最小尺寸，从而合理地捕捉狭缝特征。



尺寸函数-Soft Hard

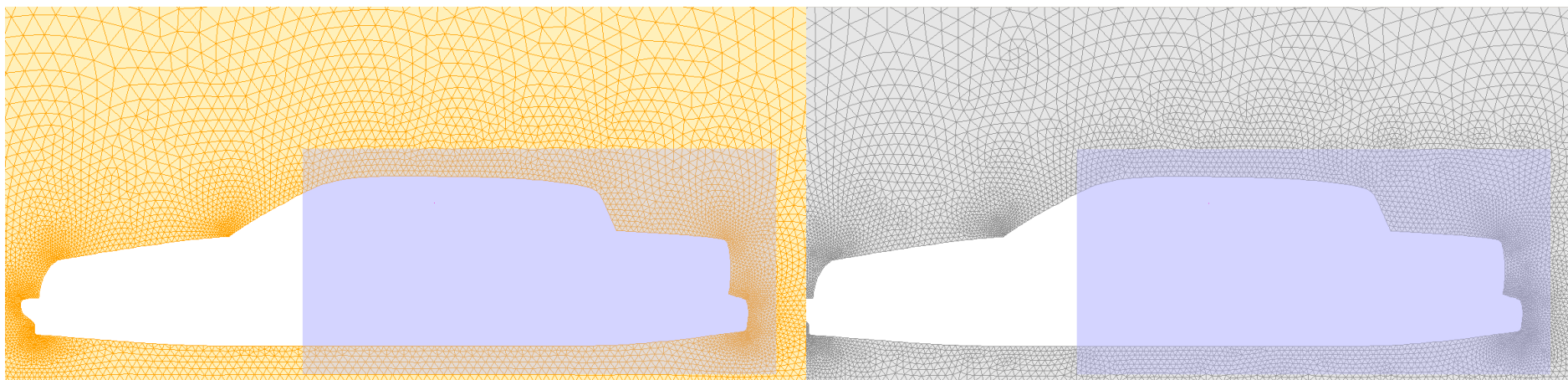
➤ Soft和Hard尺寸函数

- Hard尺寸函数设置固定尺寸
- Soft尺寸函数设置最大尺寸
- 两者都可以运用在边和面上



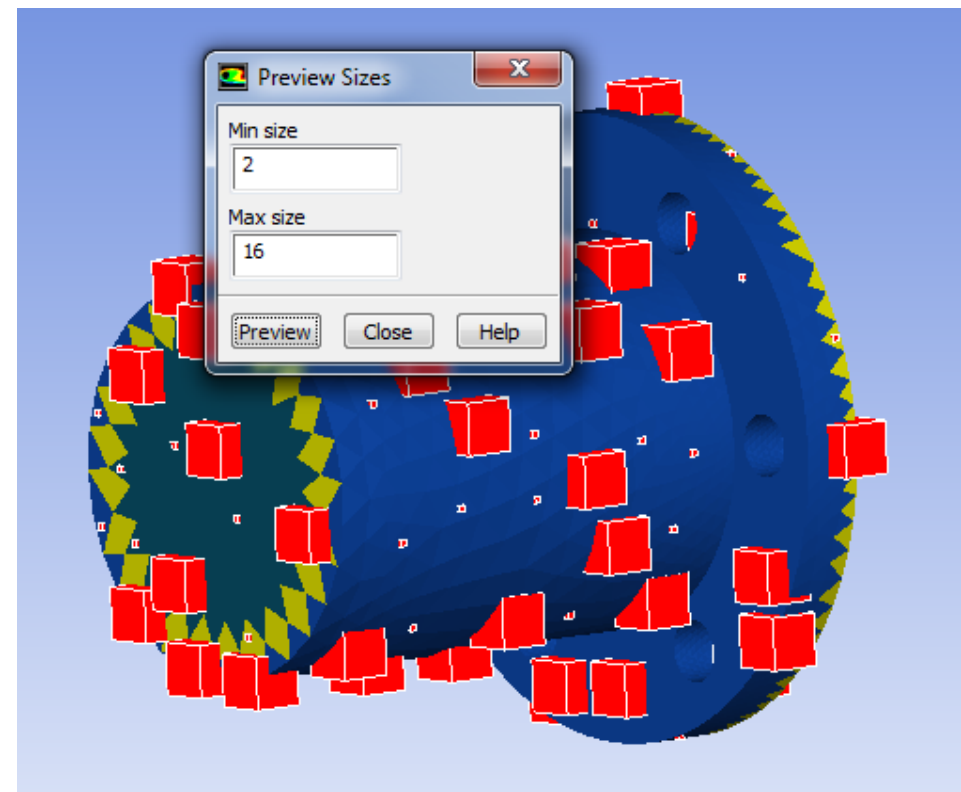
尺寸函数-BOI尺寸函数

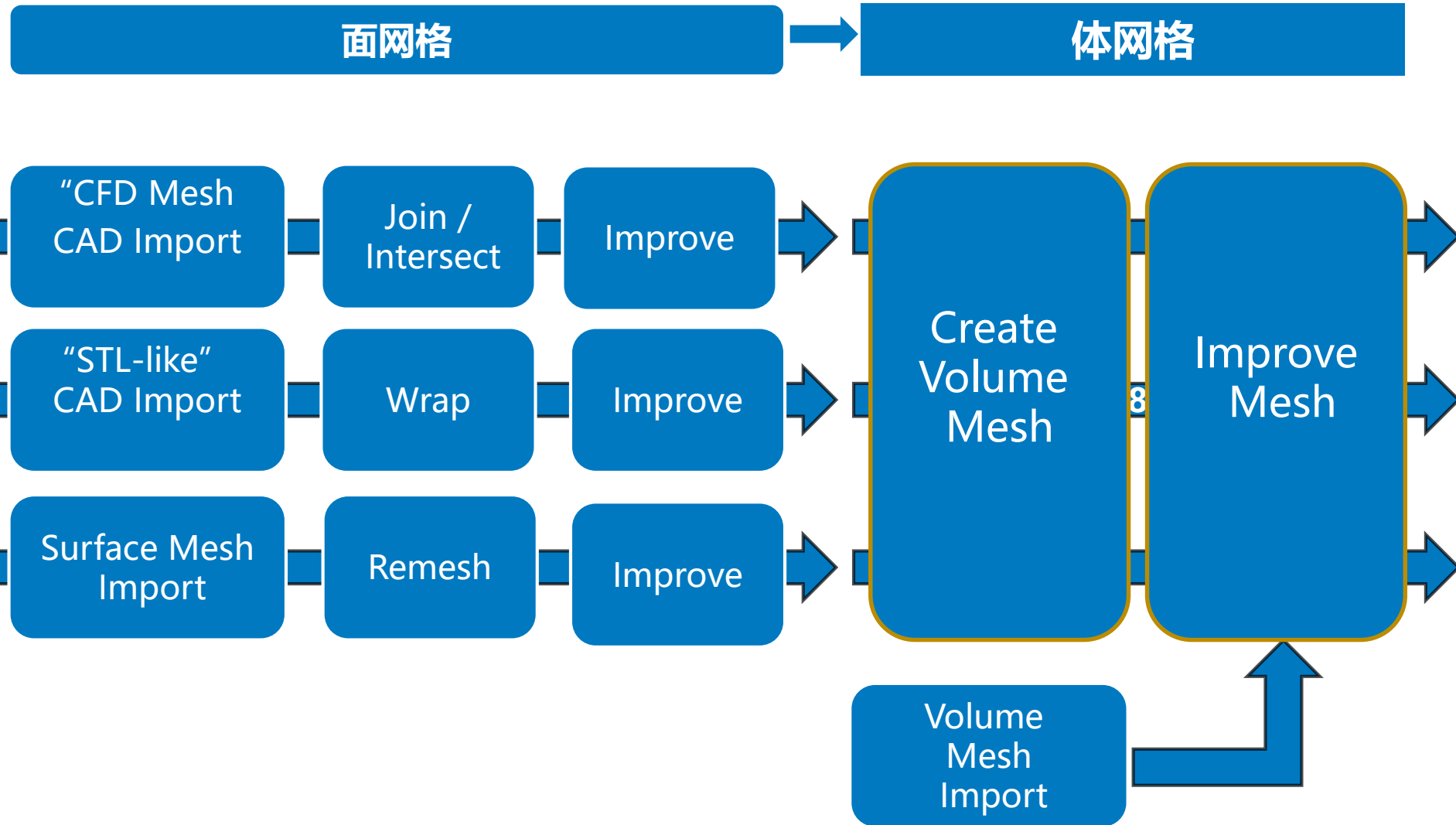
- 限制计算域局部空间内的网格尺寸为恒定值
- 面网格采用BOI限制车尾部网格过度



尺寸函数

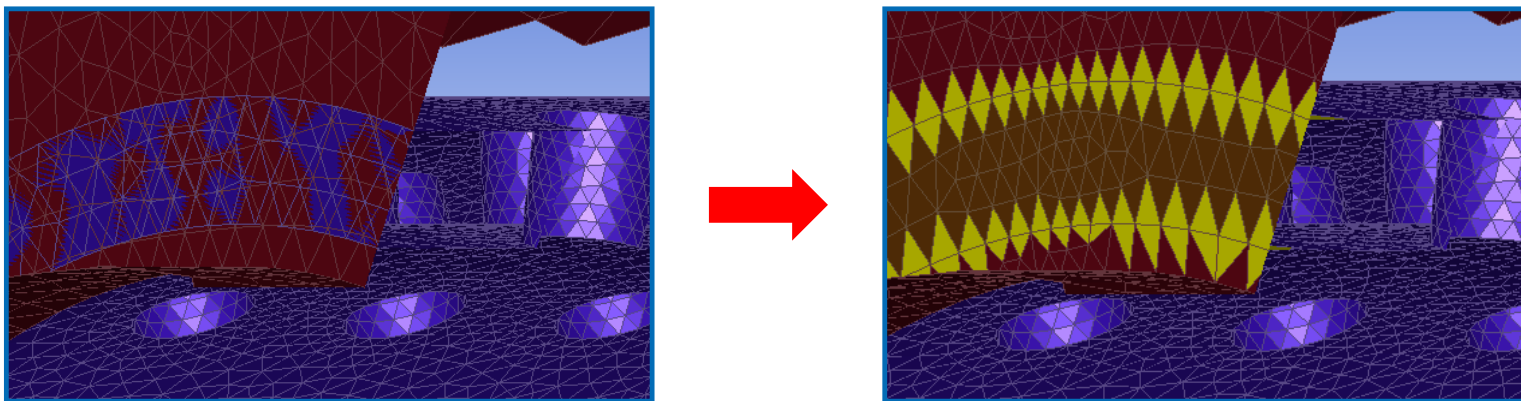
- 在默认情况下，尺寸函数驱动网格重构
- 指定尺寸函数计算网格分布
- (Size Function → Size Field)
- 通过探针或云图查看尺寸分布



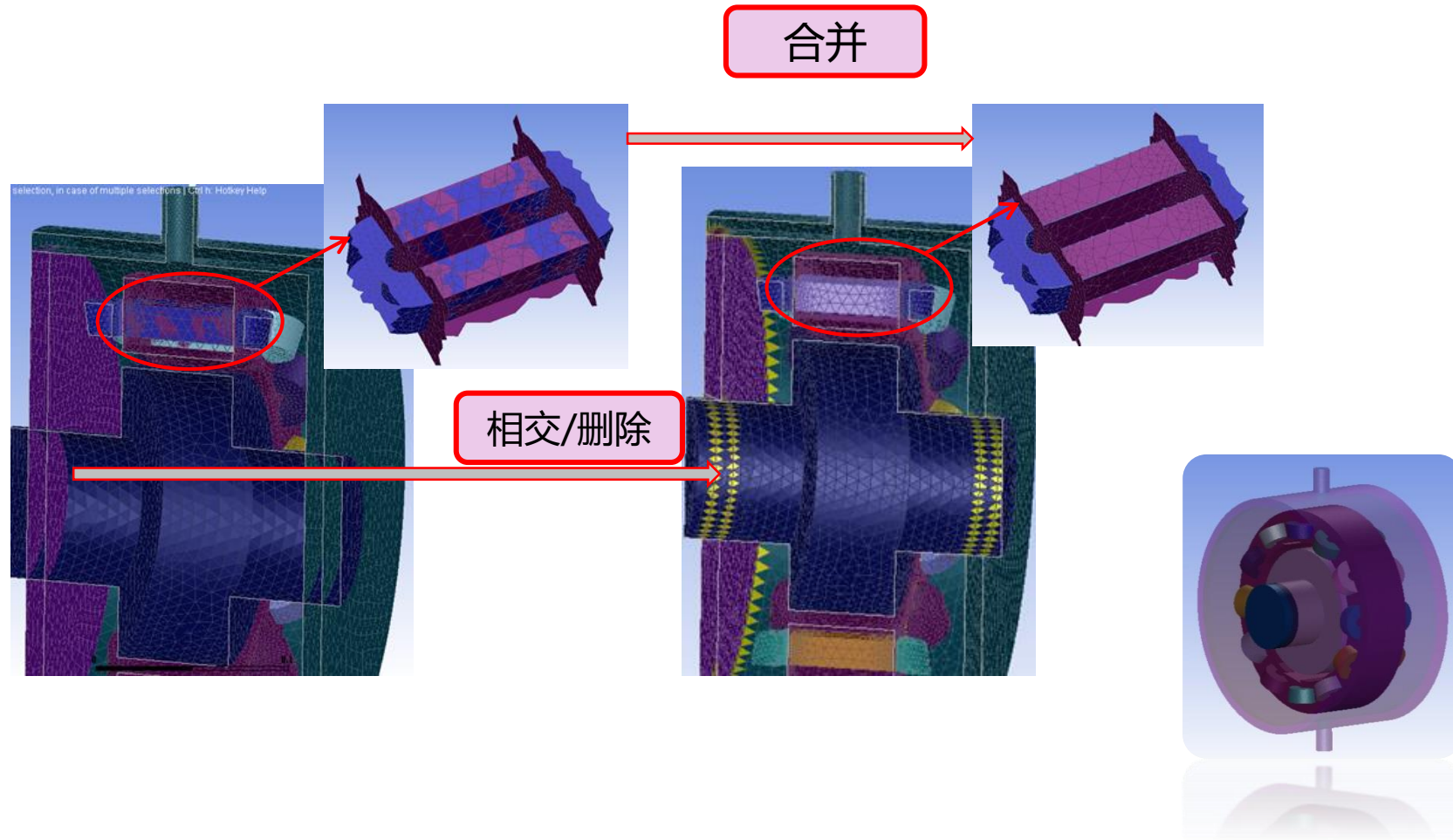


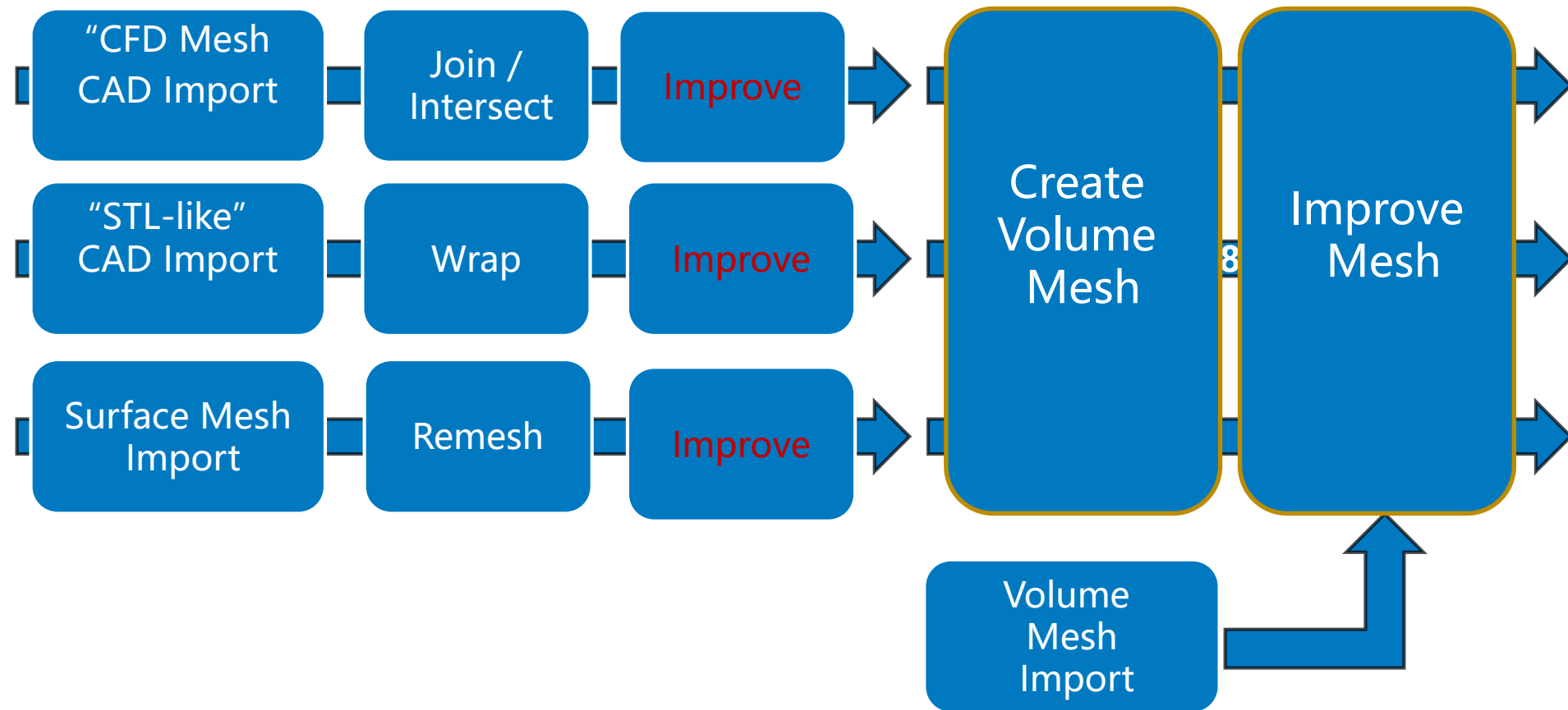
面网格连接操作-Gap Closing

- 消除面网格之间的间隙
- 连接不同的mesh Object



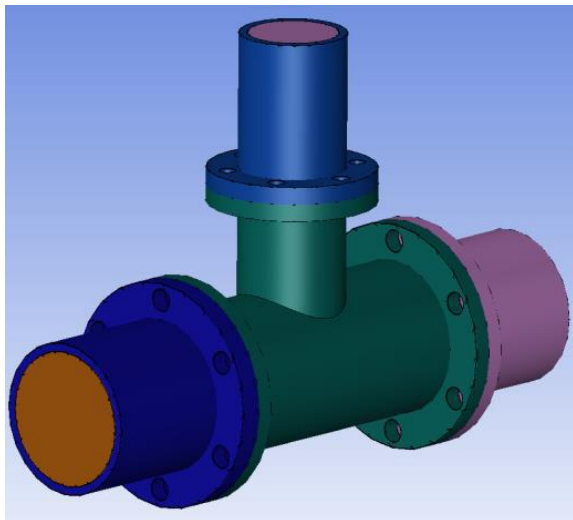
面网格连接操作-Join Intersect



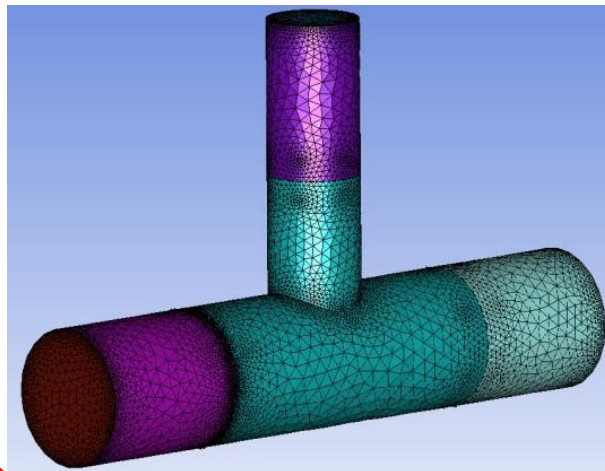


面网格重构(Remesh)

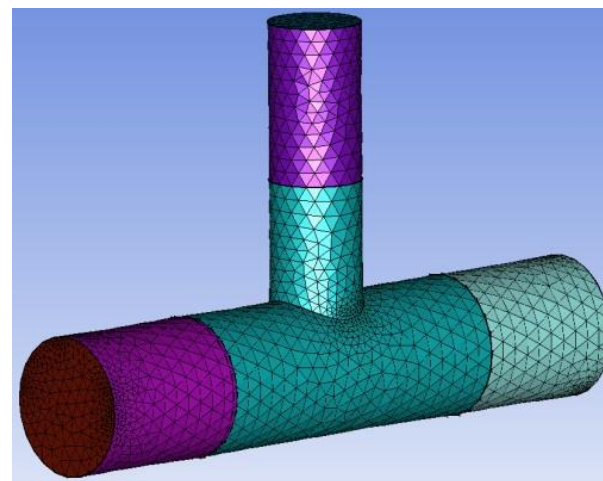
- 对局部特征的细化
- 忽略几何特征
- 创建BOI



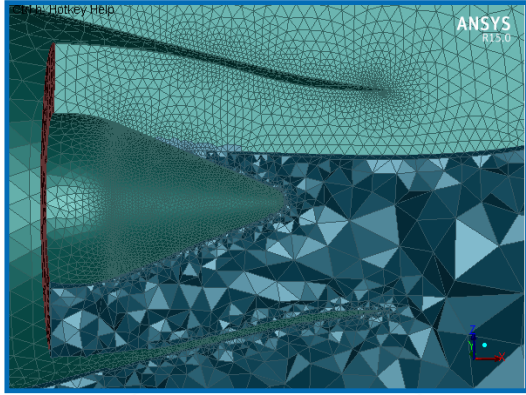
固体、洞的存在
导致包面时网格
过度细化



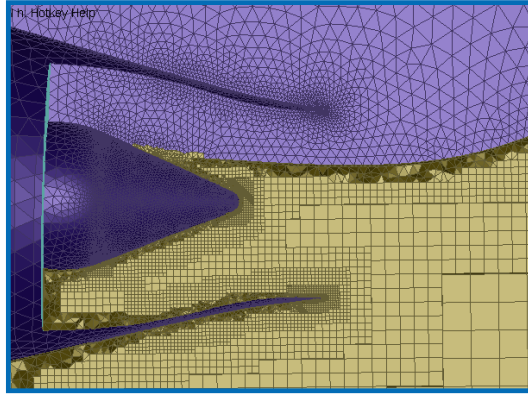
重构消除过度细化



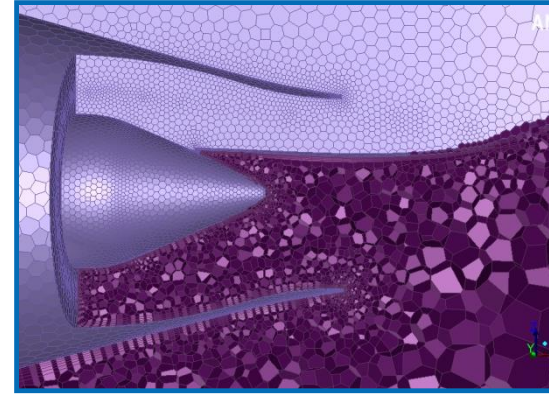
体网格划分



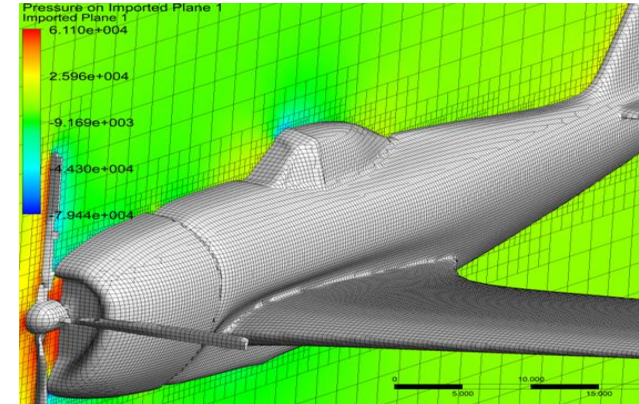
Tet



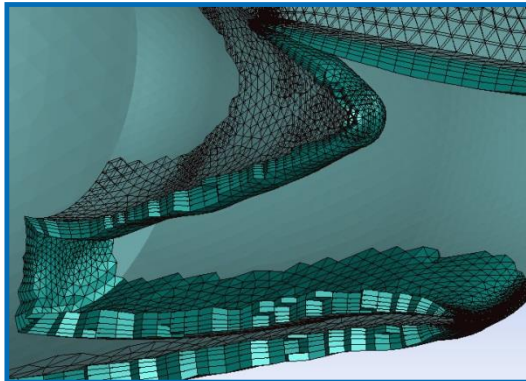
Hexcore



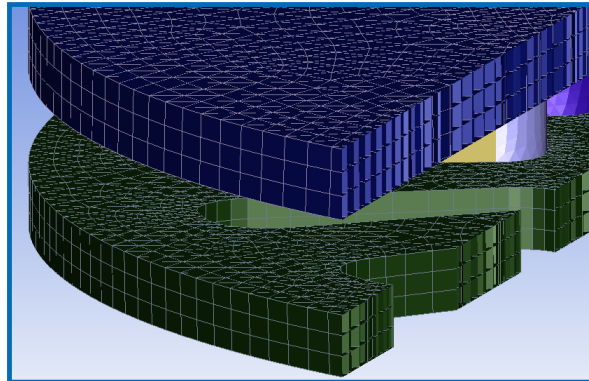
Native Poly



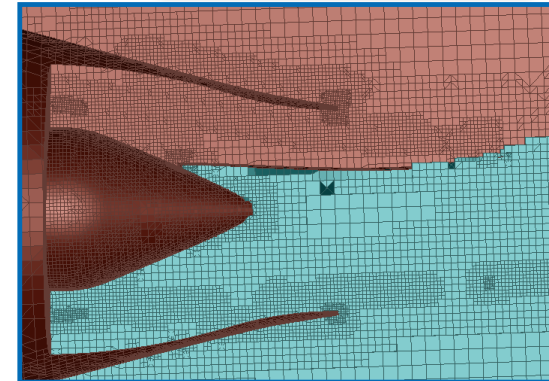
R19+



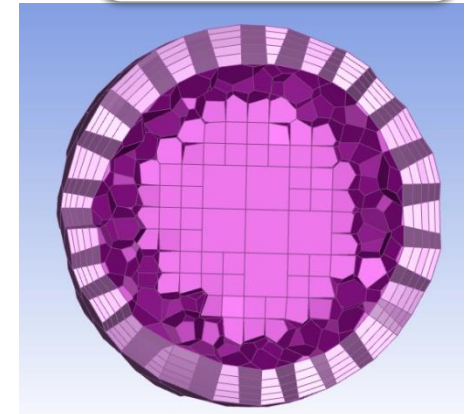
Prisms



Thin Volume



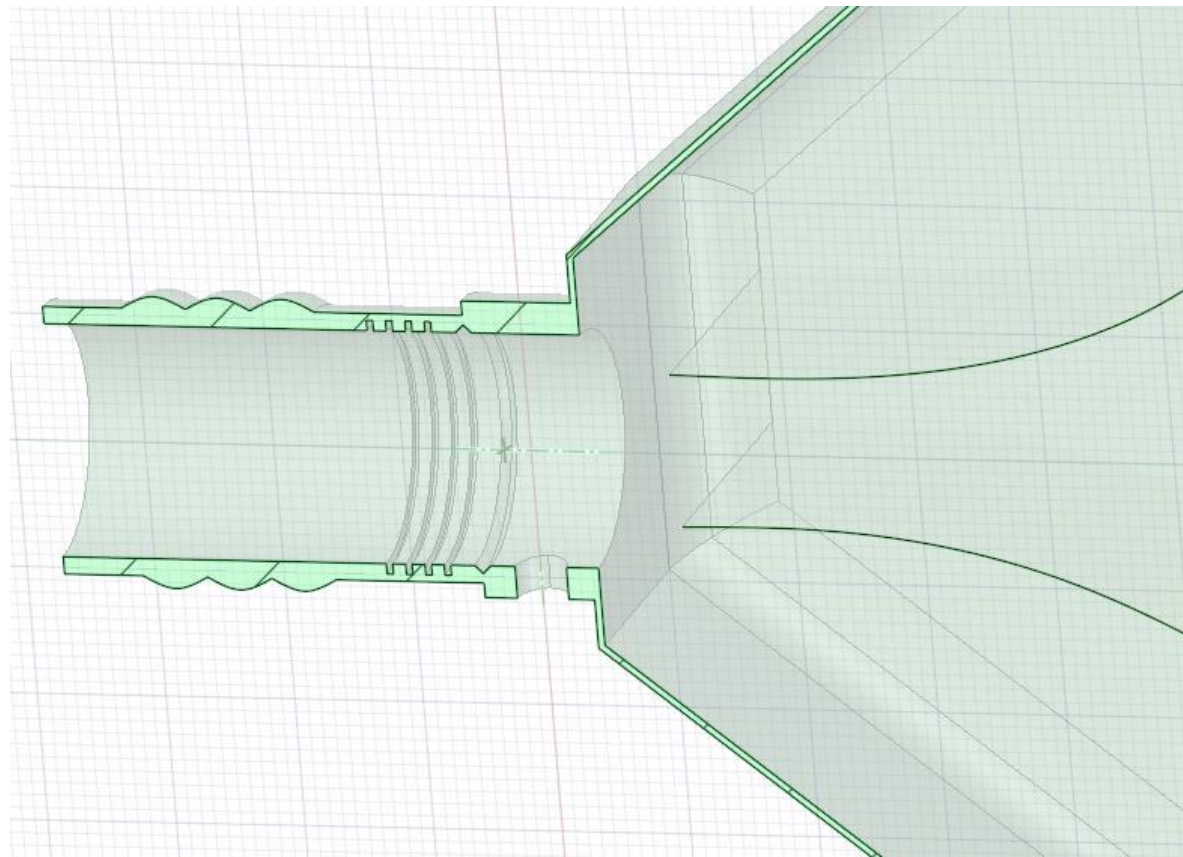
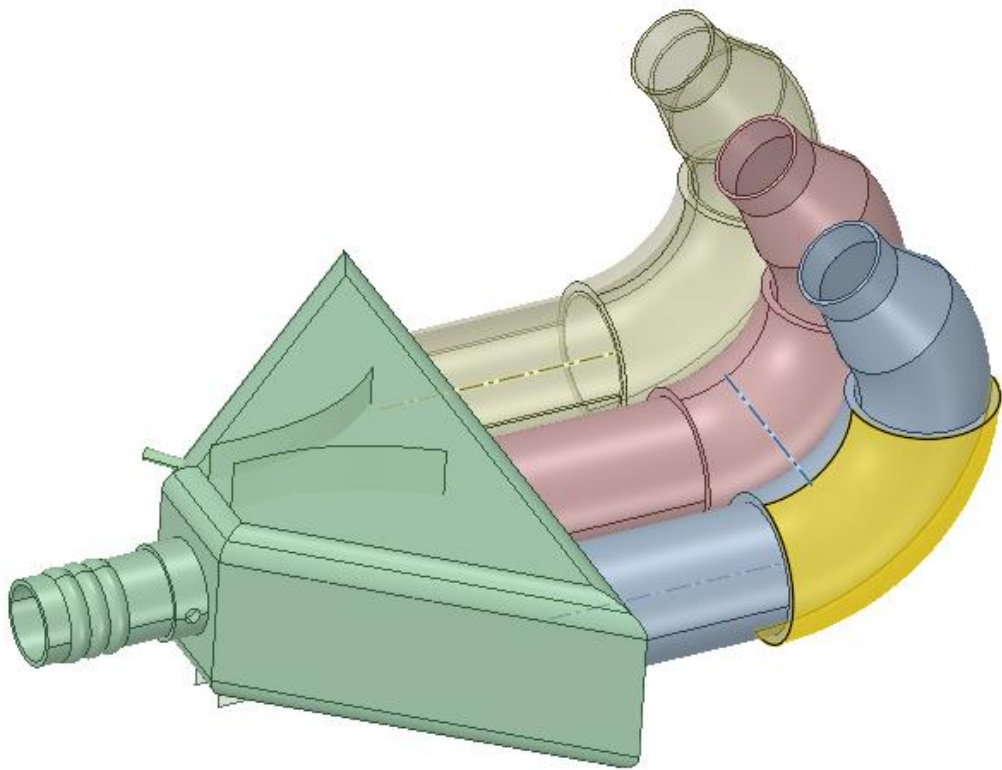
CutCell



R19+

- **尺寸函数的设定及其对网格的影响**
- **不同工具网格生成效果对比**
- **自定义网格划分流程**

一、尺寸函数



Global Scoped Sizing

Global Scoped Sizing

Min	Max	Growth Rate		
2	200	1.2	Apply	Reset

Local Scoped Sizing

Local Scoped Sizing

Name: Type:

Min	Max	
2	200	

Growth Rate: Normal Angle:

Cells Per Gap:

Face Proximity Option

- ☐ Face Boundary
- ☒ Face Face
- ☐ Ignore Self
- ☒ Ignore Orientation

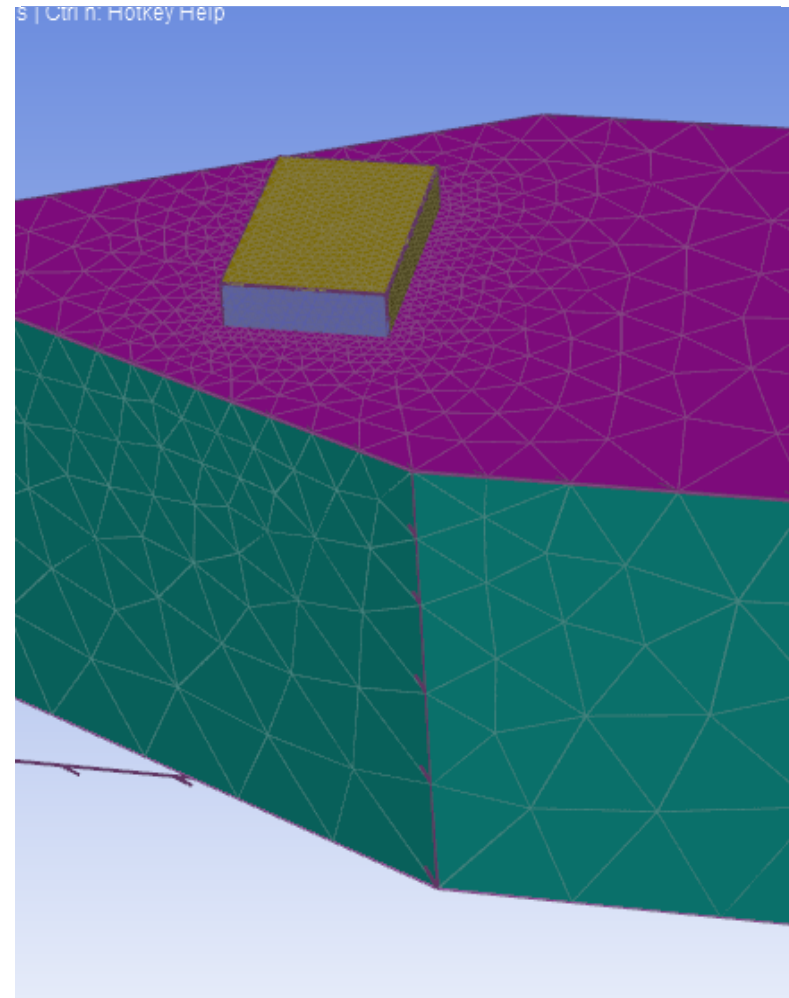
Scope

Scope To:

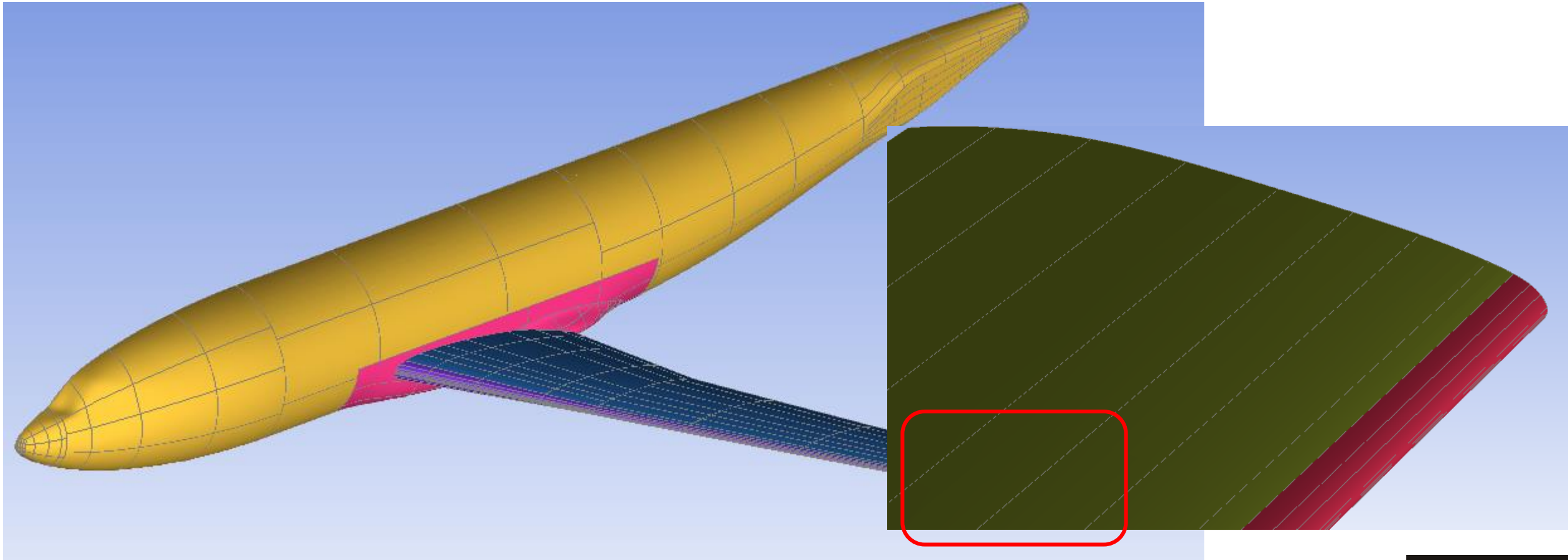
Object Type

- ☒ Geom
- ☐ Mesh

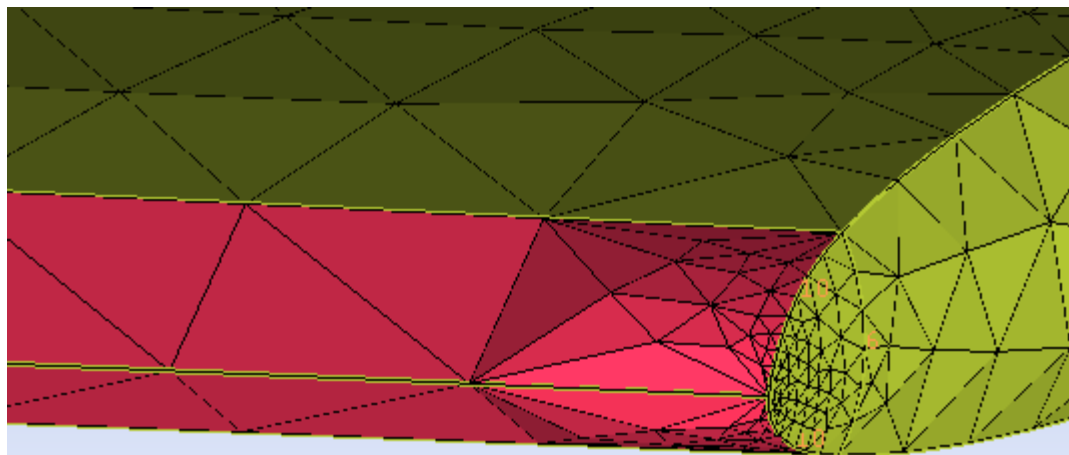
Selections:



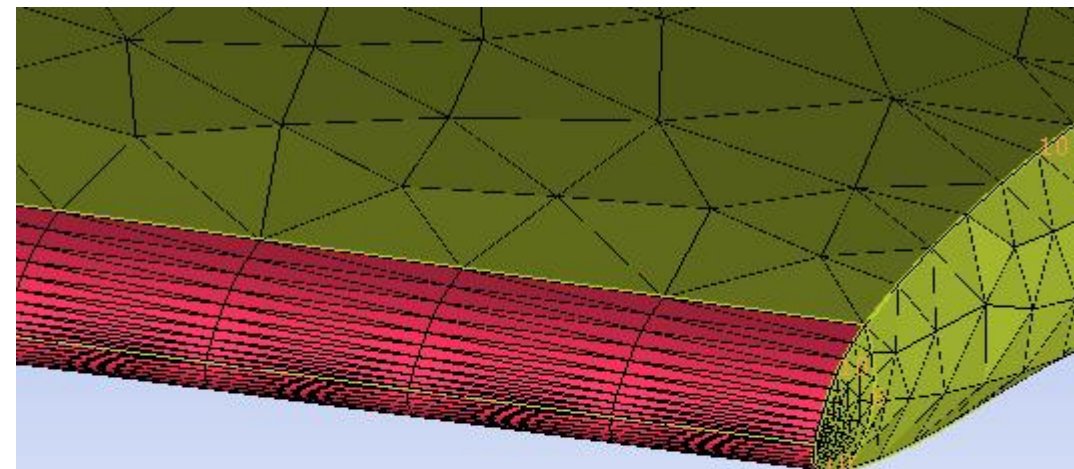
二、不同模块生成网格对比



Patch dependent Method:

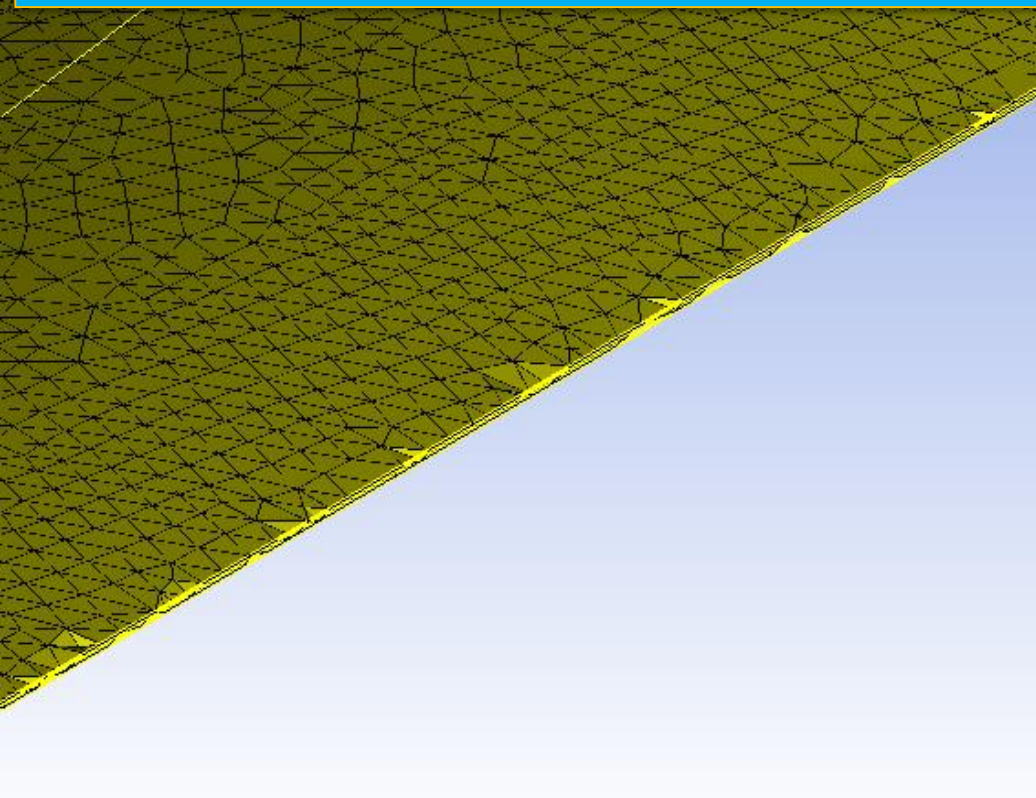


Patch Dependent(主翼面 前后缘)

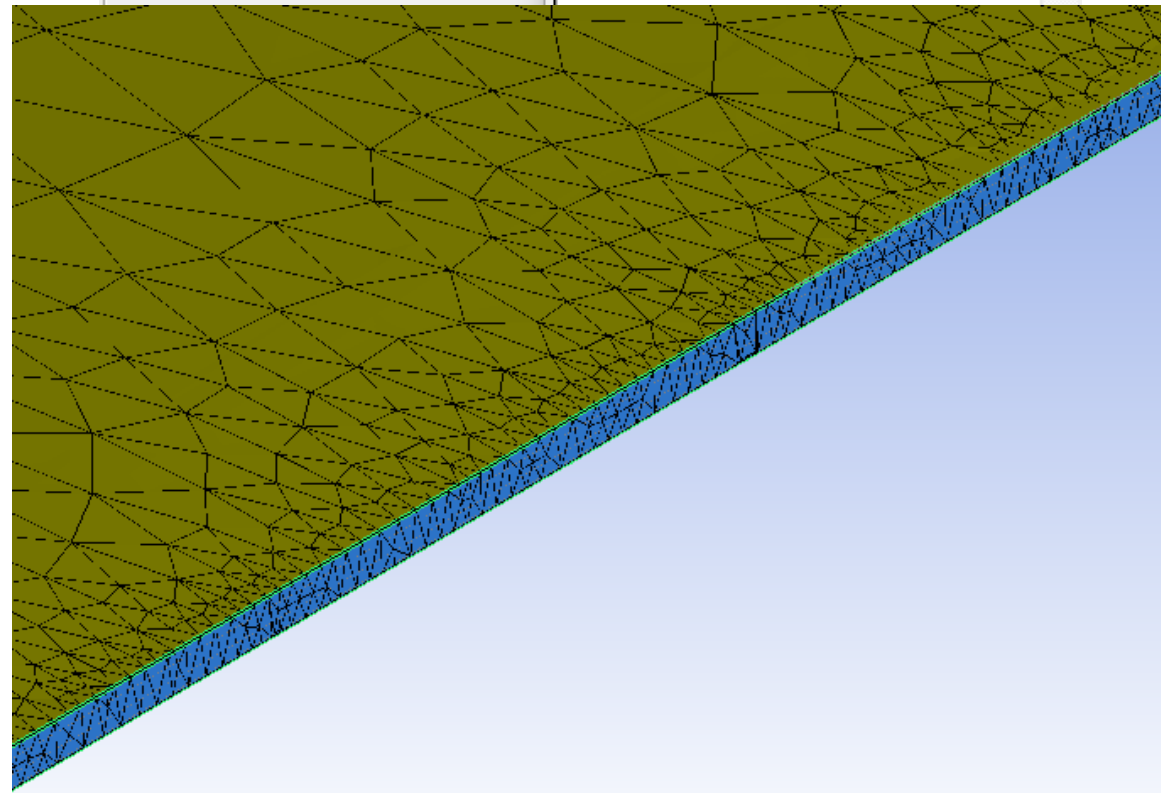


Patch Dependent(主翼面)+Auto Block(前后缘)

Patch Independent Method:

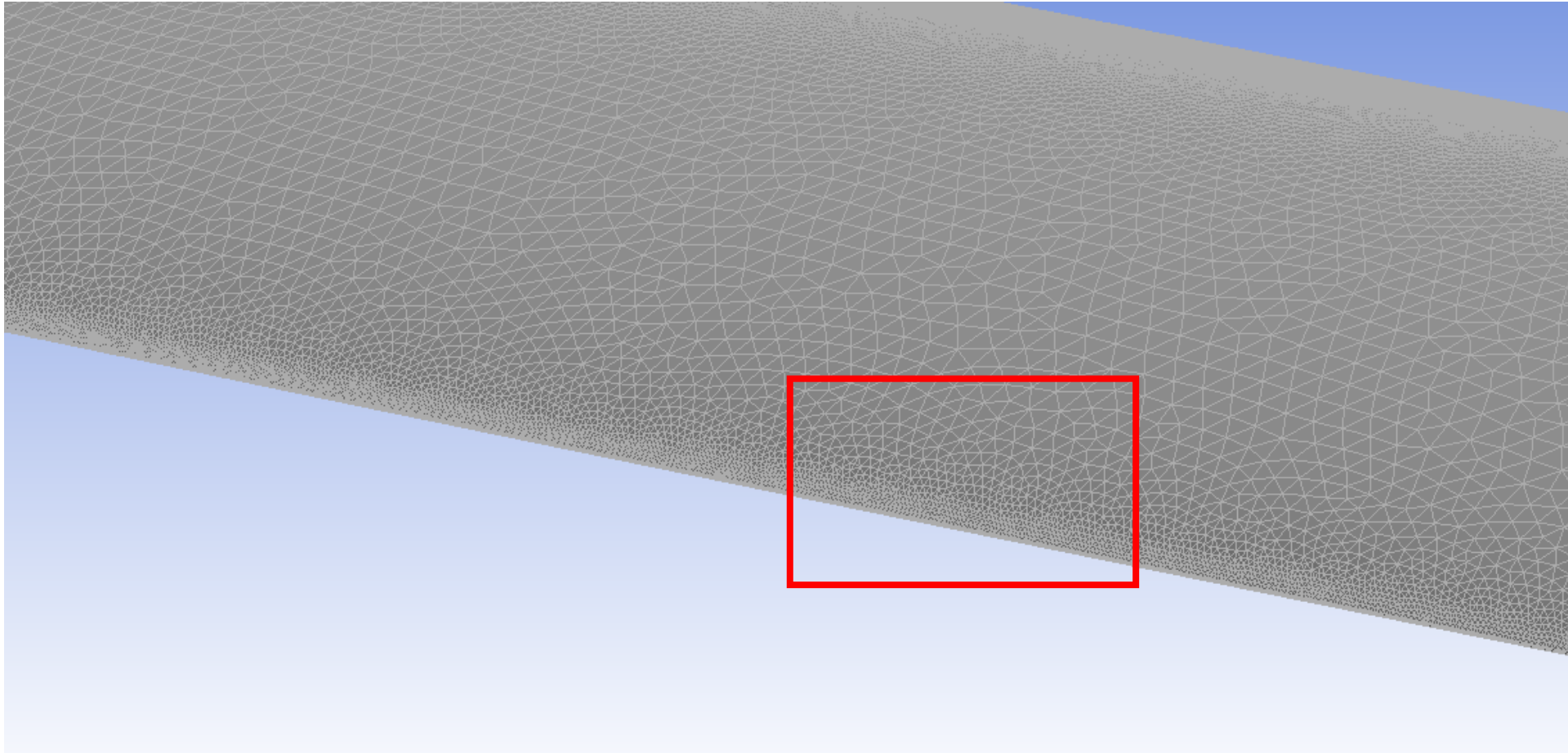


Without Thincut



With Thincut

Fluent Mesh(Curvature and Proximity Based Refinement)



三、自定义网格划分流程

感谢聆听！

