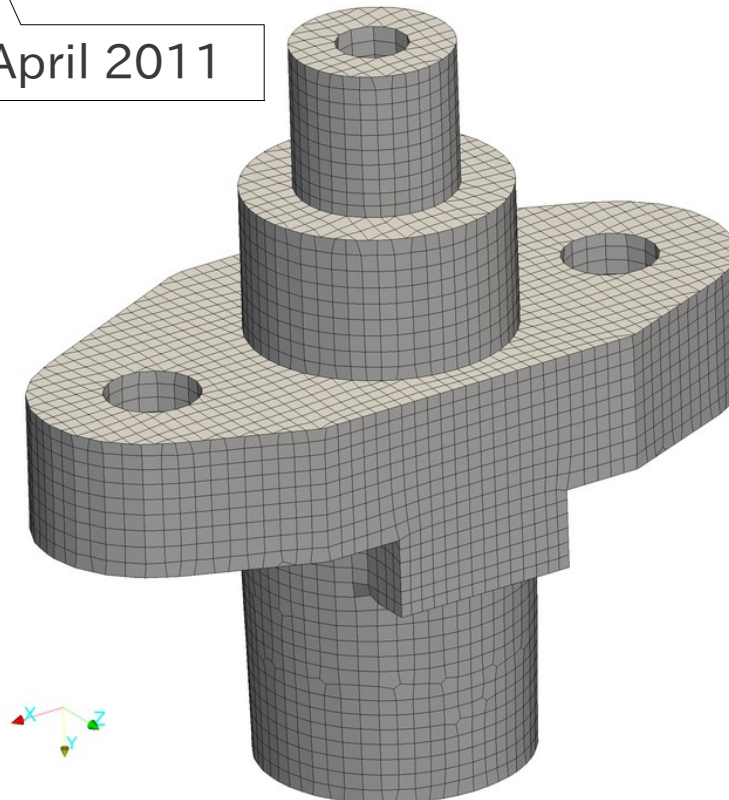


snappyHexMesh の新機能紹介

オープンCAE学会
野村 悦治
2011/6/26

11th April 2011



snappyHexMesh gets Feature Edge Handling

OpenCFD Ltd. have introduced feature-edge handling into *snappyHexMesh* — their automatic, parallelised, hexadral mesher for complex CAD, released with OpenFOAM.

Complex geometries may contain sudden changes in surface normal direction, e.g. between sides of a box, or across a crease in a surface. Such a *feature* can be resolved reasonably well by refining cells locally around it. However the feature can be better resolved by aligning edges in the mesh with it. The sudden change in surface normal direction can then be directly represented by an equivalent change in surface normal direction of mesh faces across feature.

The image below shows feature edge handling in action. On this flange geometry, a mesh has been generated with barely enough cells to resolve the geometry. Nevertheless, with the feature edge handling, mesh edges are aligned with surface features so that the geometry is well represented by the coarse mesh.

This development was undertaken at OpenCFD by Mattijs Janssens, the creator of *snappyHexMesh*. Like everything OpenCFD produces, it will be released **free and open source**. It will be available in the next release of OpenFOAM; we hope OpenFOAM users find it useful.

OpenCFD Ltd
11th April 2011

News on Twitter

"#OpenFOAM v2.0.0 includes new modelling of #surface #films, coupled with continuum and particle bulk flows, in parallel: <http://t.co/qUcb8ue>" yesterday

"#OpenCFD release #OpenFOAM version 2.0.0, with an extensive set of new features: <http://t.co/WyhhAE>" Jun 16th 2011

[More news on Twitter...](#)

Main News

OpenCFD release OpenFOAM® version 2.0.0
OpenCFD are pleased to announce the release of version 2.0.0 of their OpenFOAM open source CFD toolbox.
Jun 16th 2011

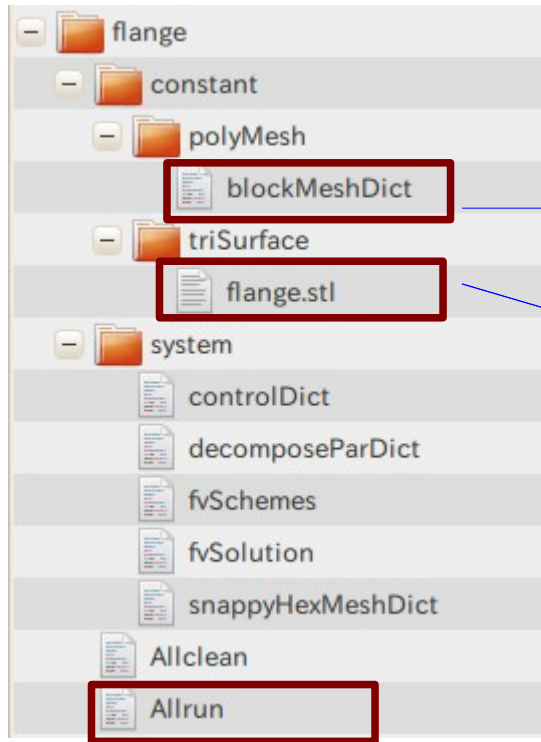
OpenFOAM on Windows
OpenCFD presents a guide to run OpenFOAM in Windows using a VirtualBox virtual machine with Ubuntu guest OS
May 25th 2011

OpenFOAM on Amazon Elastic Cloud Compute
OpenCFD presents a quick start guide on running OpenFOAM on Amazon Elastic Cloud Compute (EC2).
May 6th 2011

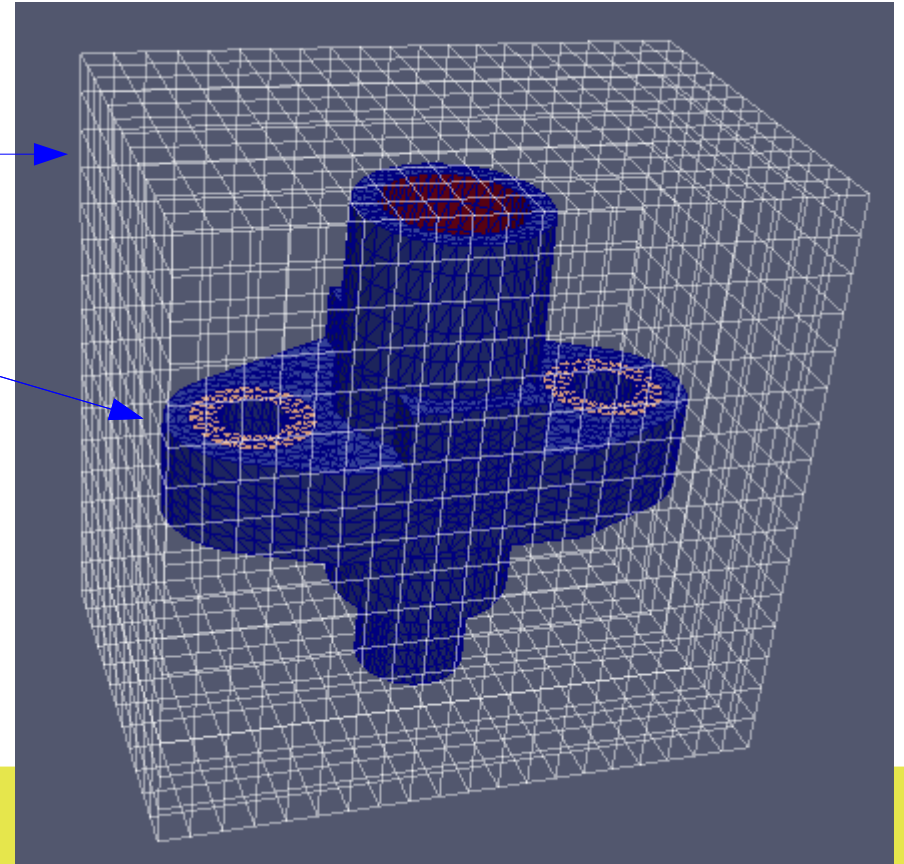
[Main News Archive...](#)

チュートリアルケース

\$FOAM_TUTORIALS/mesh/snappyHexMesh/flange



blockMesh



```
#!/bin/sh
```

```
# Source tutorial run functions
```

```
. $WM_PROJECT_DIR/bin/tools/RunFunctions
```

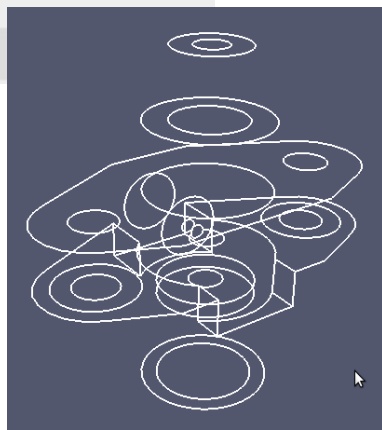
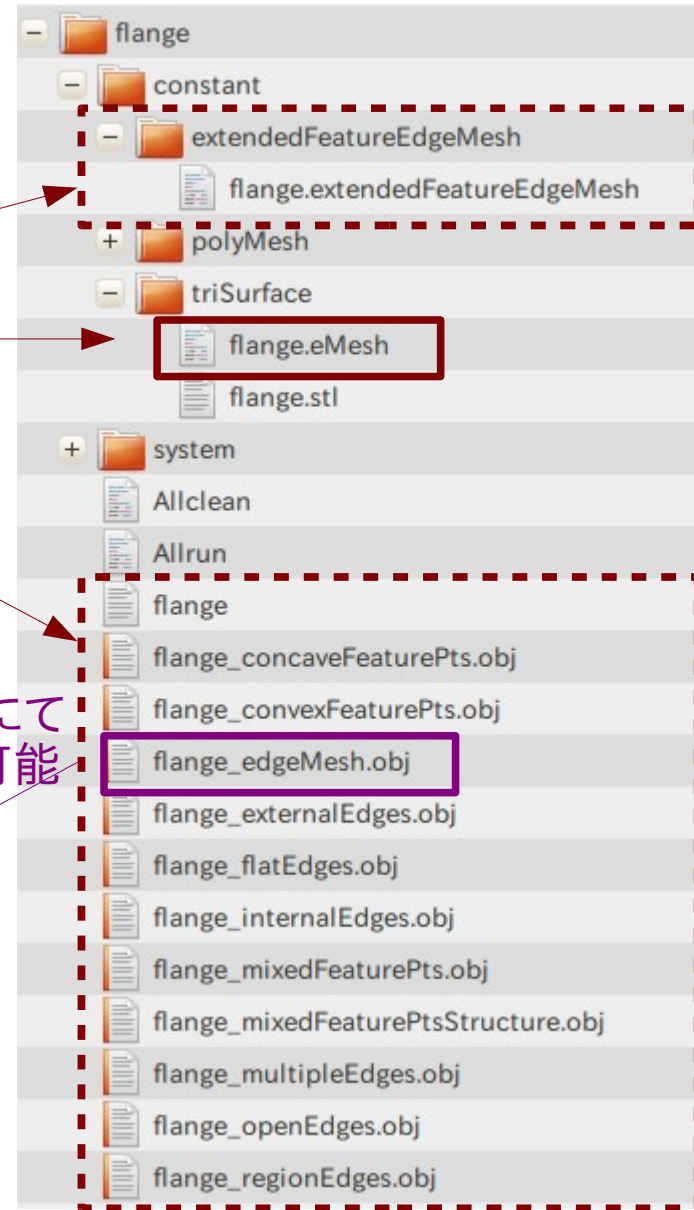
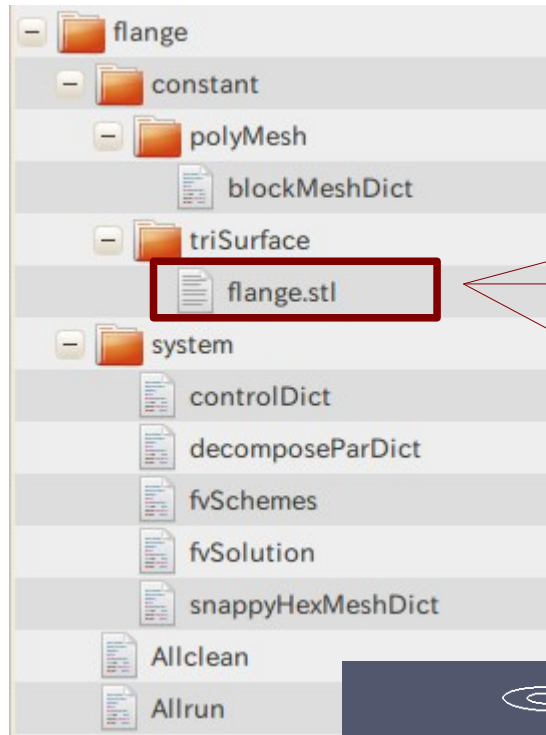
```
runApplication blockMesh
```

```
runApplication surfaceFeatureExtract -includedAngle 150 -writeObj constant/triSurface/flange.stl flange
```

```
runApplication snappyHexMesh -overwrite
```

surfaceFeatureExtract

surfaceFeatureExtract -includedAngle 150 -writeObj constant/triSurface/flange.stl flange



ParaViewにて
表示確認可能

中間ファイル

後の工程 (snappyHexMesh) では使用しない

snappyHexDict

1.7.x ⇒ 2.0.x 変化点

castellatedMesh
snap
addLayers
geometry
castellatedMeshControls
maxLocalCells
maxGlobalCells
minRefinementCells
maxLoadUnbalance
nCellsBetweenLevels
features
refinementSurfaces
resolveFeatureAngle
refinementRegions
locationInMesh
allowFreeStandingZoneFaces
snapControls
nSmoothPatch
tolerance
nSolverIter
nRelaxIter
nFeatureSnapIter

Featureデータ
(*eMesh)を定義

これがないと
動作しない

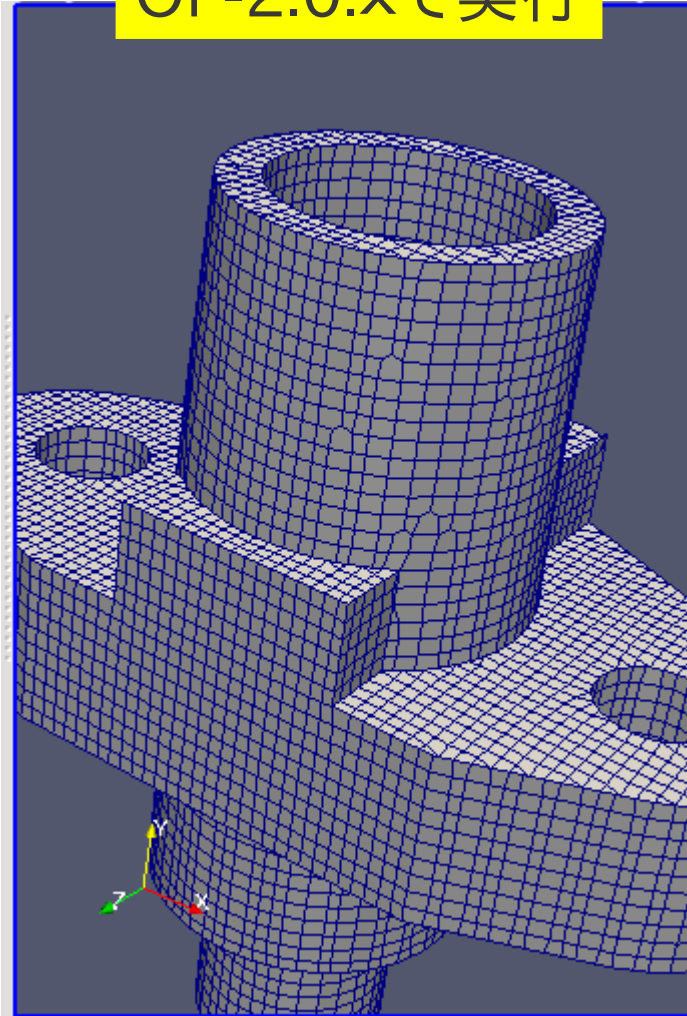
これがないと
FeatureSnapp
が機能しない

addLayersControls
relativeSizes
layers
expansionRatio
finalLayerThickness
minThickness
nGrow
featureAngle
nRelaxIter
nSmoothSurfaceNormals
nSmoothNormals
nSmoothThickness
maxFaceThicknessRatio
maxThicknessToMedialRatio
minMedianAxisAngle
nBufferCellsNoExtrude
nLayerIter
nRelaxedIter
meshQualityControls
maxNonOrtho
maxBoundarySkewness
maxInternalSkewness
maxConcave
minVol
minTetQuality
minArea
minTwist
minDeterminant
minFaceWeight
minVolRatio
minTriangleTwist
nSmoothScale
errorReduction
relaxed
debug
mergeTolerance

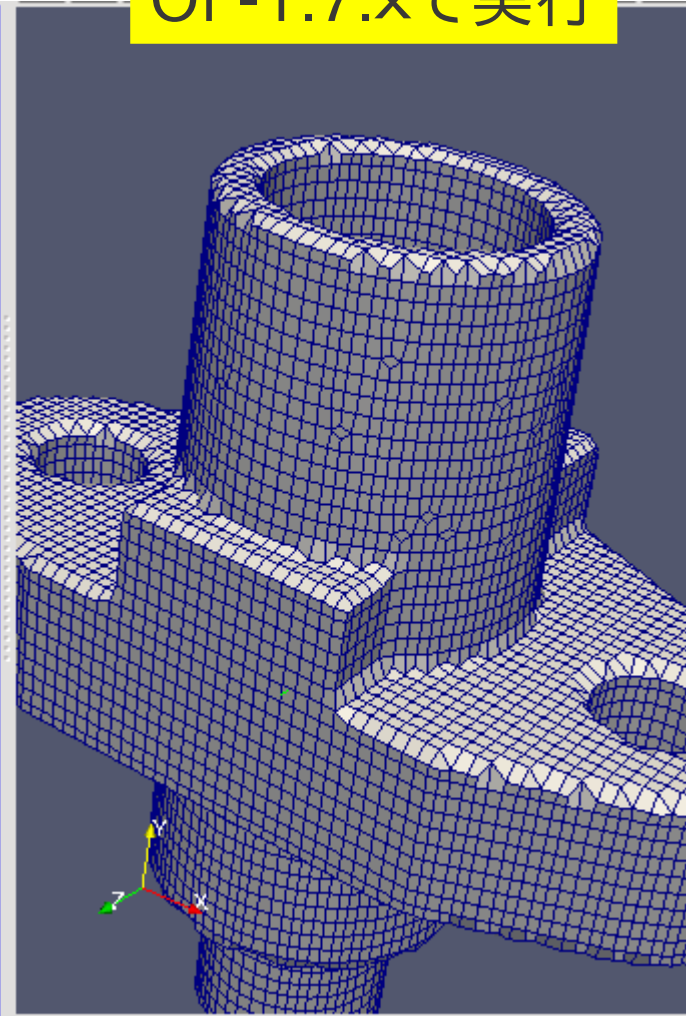
2.0.x 用の snappyHexDict は、OF-1.7.xでも動作可能

snappyHexMesh

OF-2.0.xで実行

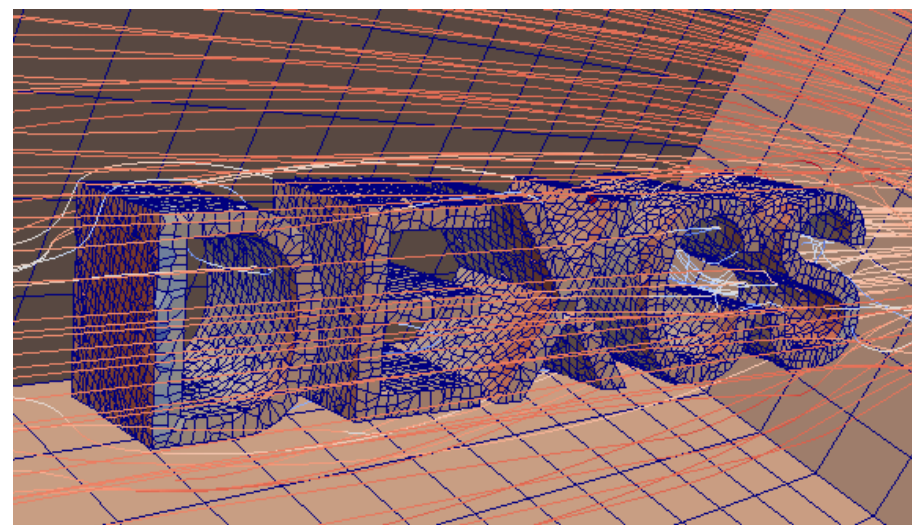
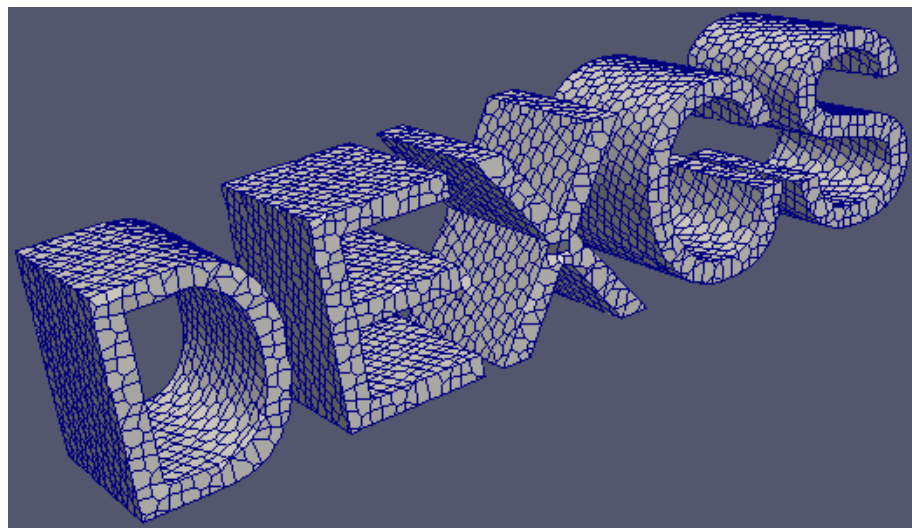


OF-1.7.xで実行

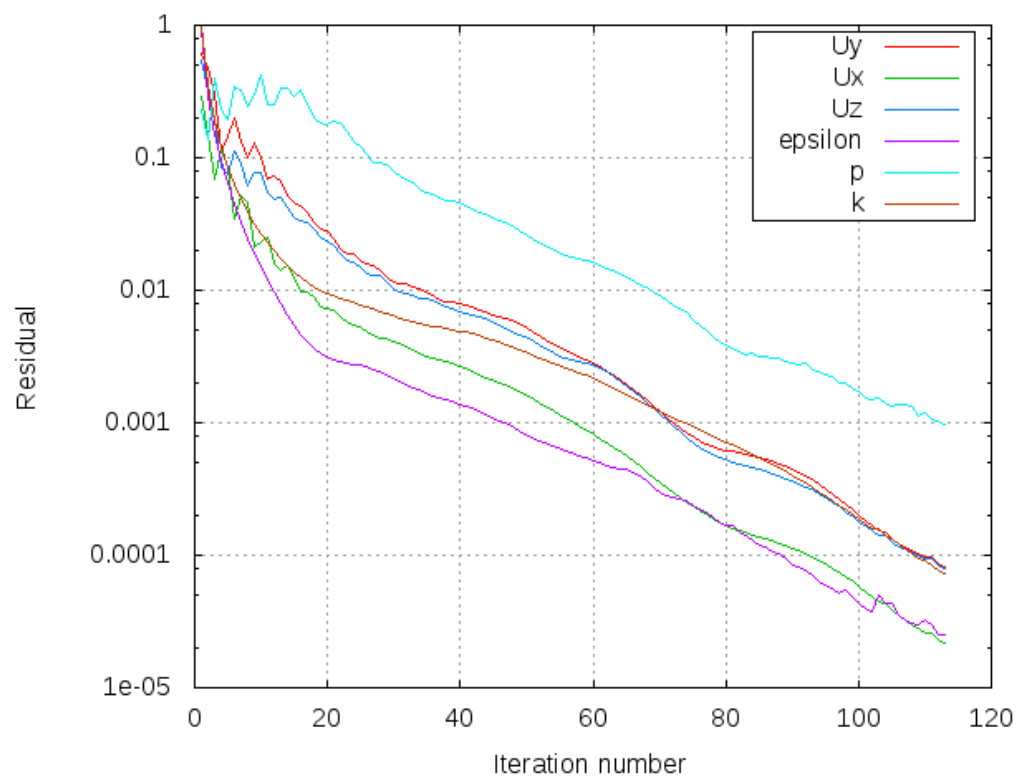
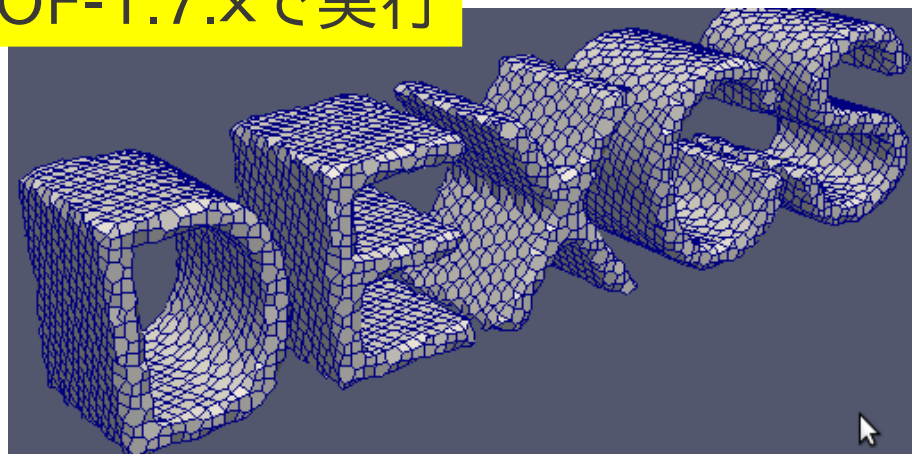


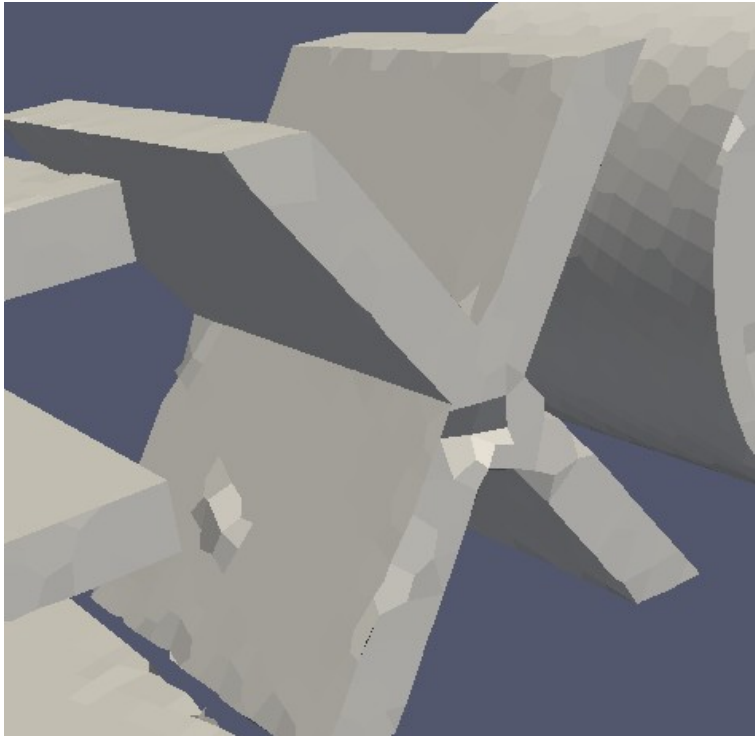
DEXCS for OpenFOAM(R) の標準モデルで作成

<http://mogura7.zenno.info/~et/xoops/modules/wordpress/index.php?p=405>

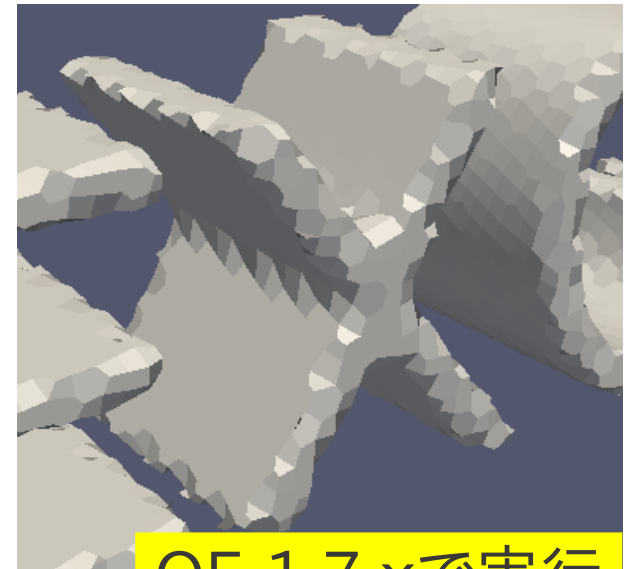


OF-1.7.xで実行





```
156 // Settings for the snapping.
157 snapControls
158 {
159     //- Number of patch smoothing iterations before finding correspondence
160     // to surface
161     nSmoothPatch 3;
162
163     //- Relative distance for points to be attracted by surface feature point
164     // or edge. True distance is this factor times local
165     // maximum edge length.
166     tolerance 1.0;
167
168     //- Number of mesh displacement relaxation iterations.
169     nSolveIter 300;
170
171     //- Maximum number of snapping relaxation iterations. Should stop
172     // before upon reaching a correct mesh.
173     nRelaxIter 5;
174
175     //- Highly experimental and wip: number of feature edge snapping|
176     // iterations. Leave out altogether to disable.
177     nFeatureSnapIter 10;
178 }
```



OF-1.7.xで実行

