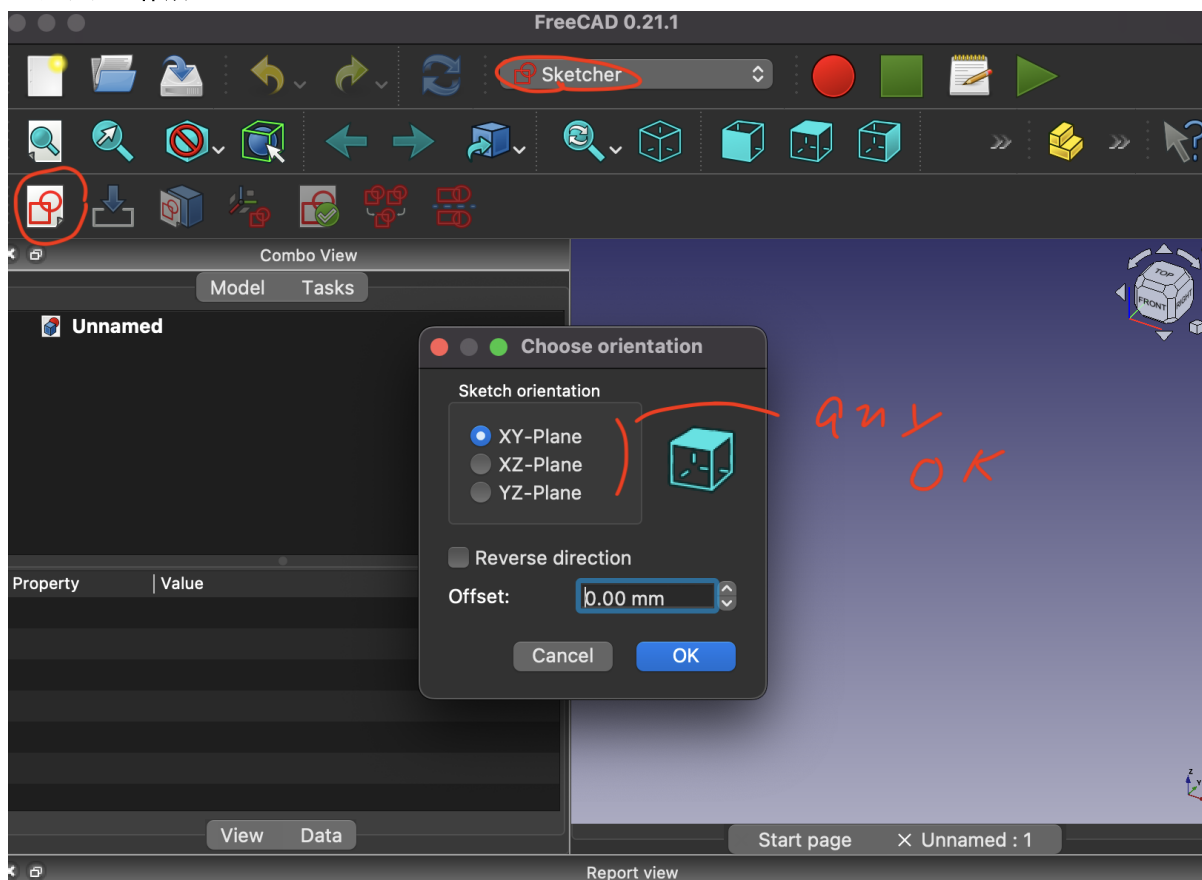


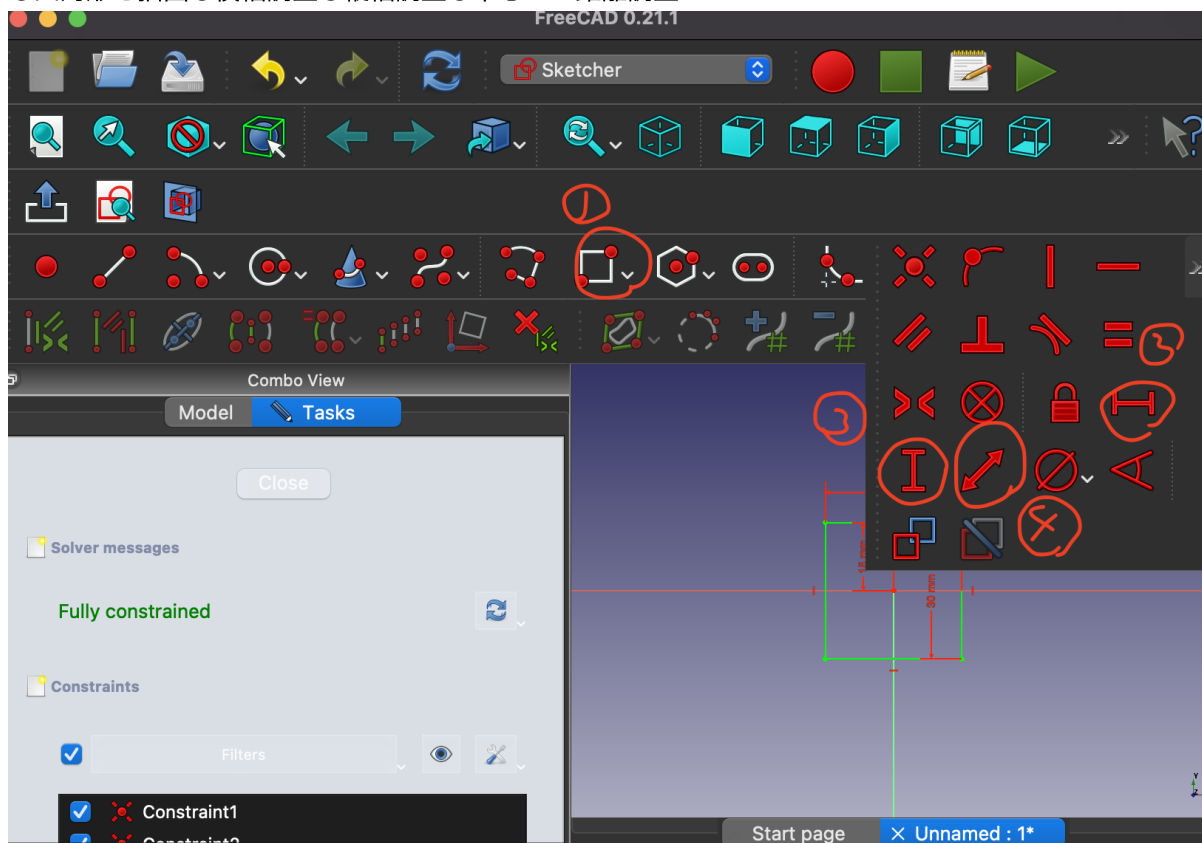
# 熱伝導解析@openfoam

- CADでastファイルを作る

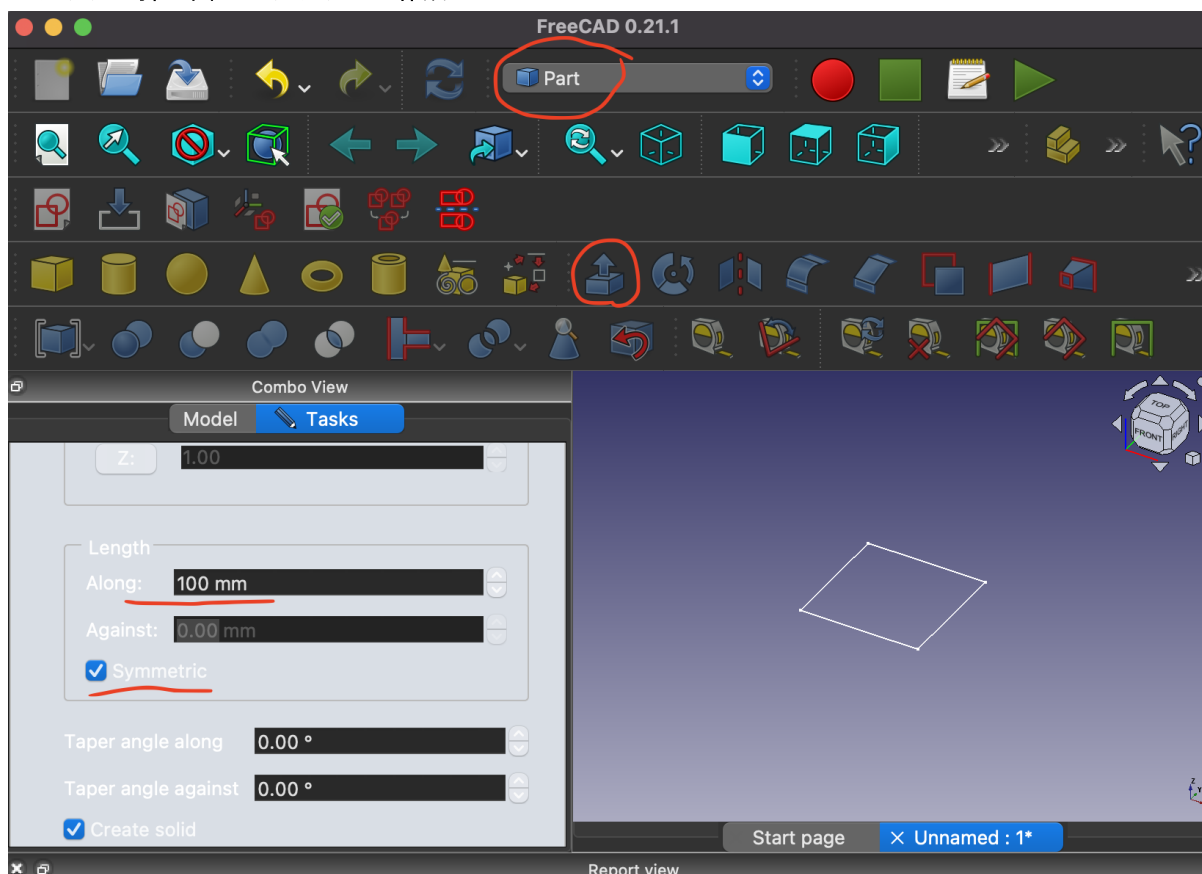
## 1. スケッチを作成



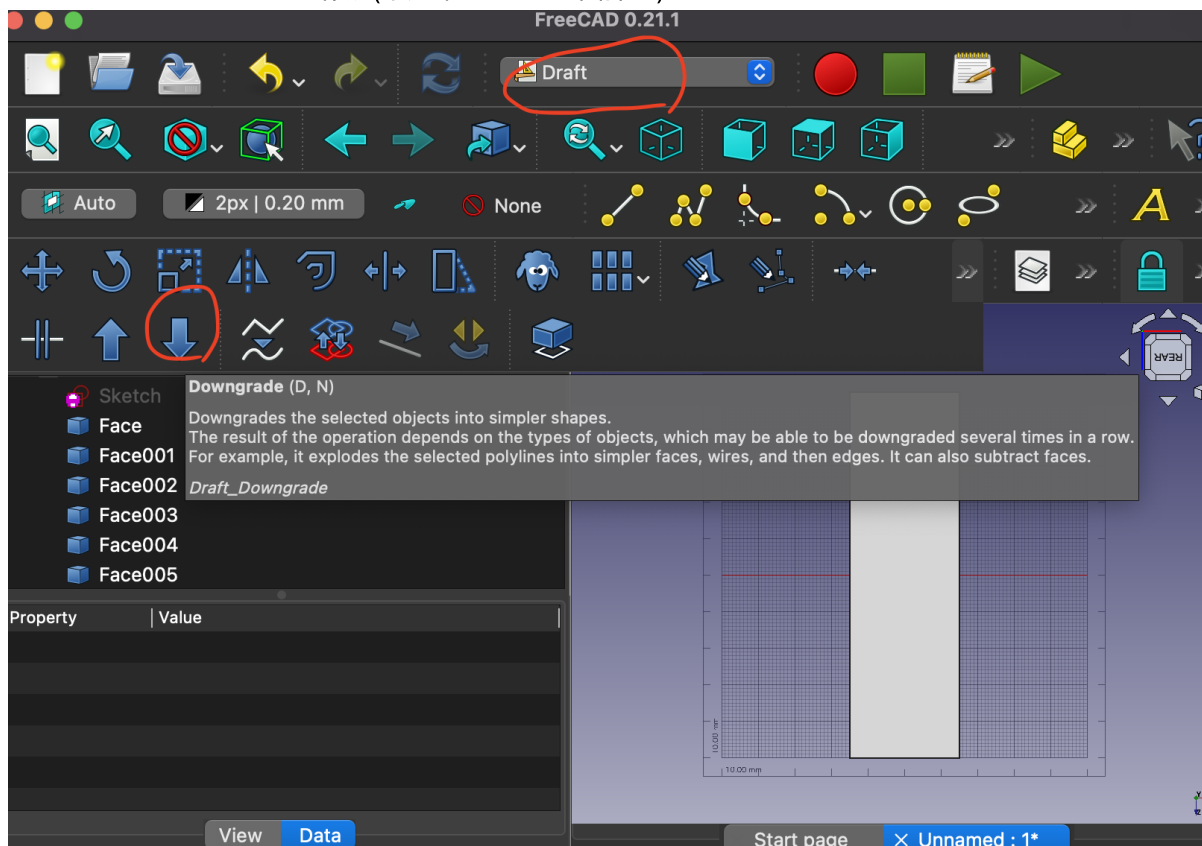
## 2. ①四角形を描画②横幅調整③縦幅調整④中心との距離調整



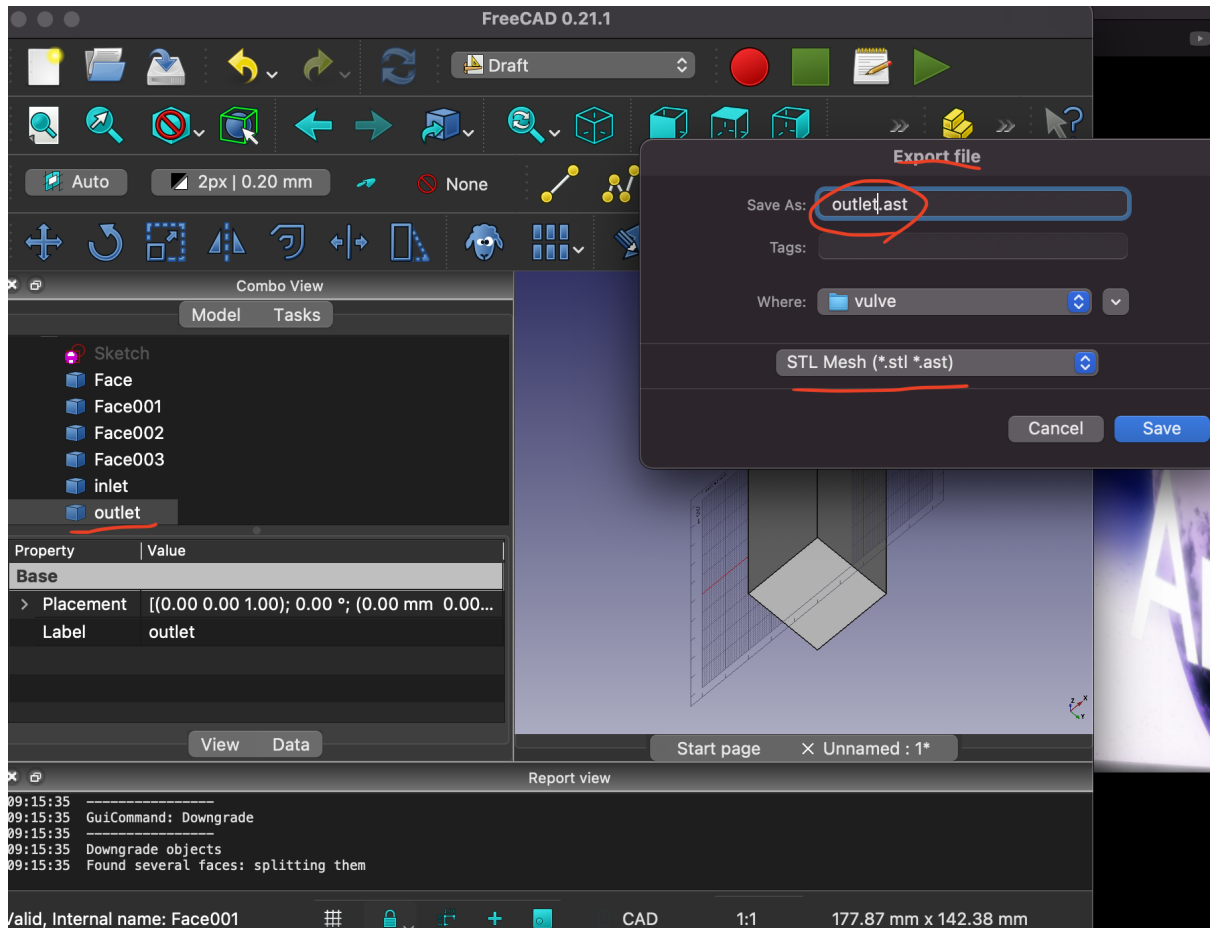
## 3. スケッチを押し出してソリッドを作成



## 4. ソリッドからサーフェスを作成(下矢印ボタンを2回押す)

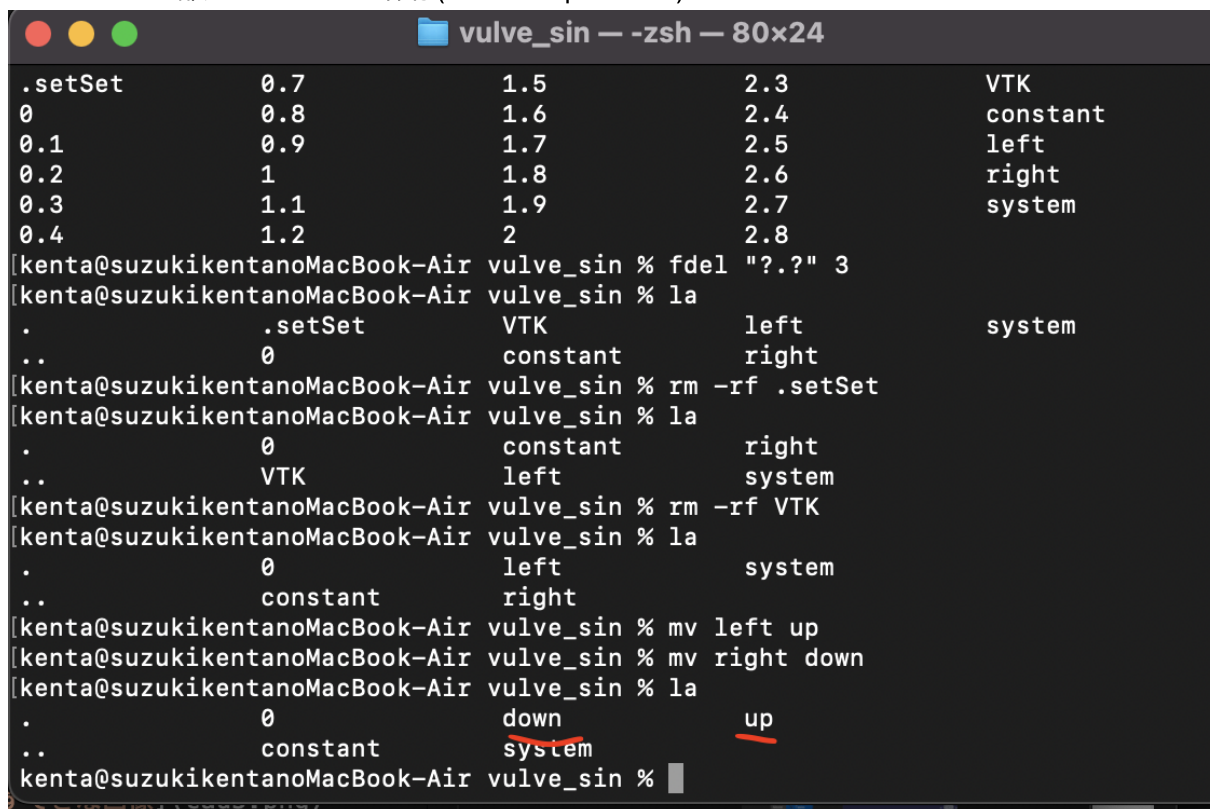


## 5. fileメニューからサーフェスをastファイルとして出力(複数一括出力もOK)



## 6. この後は部分ごとにメッシュを作成するケースについて説明

## 7. astファイルを部分ごとにわけて保存(ここではupとdown)



8. astファイル内のMeshの部分を任意のサーフェス名に置換

```
vulve_sin — Vim up/face.ast up/outlet1.ast up/wall.ast — 80x24
```

```
solid Mesh  
  facet normal 0.997564 0.069756 0.000000  
    outer loop  
      vertex 15.000000 0.000000 50.000000  
      vertex 15.000000 0.000000 0.000000  
      vertex 14.854021 2.087596 50.000000  
    endloop  
  endfacet  
  facet normal 0.997564 0.069756 -0.000000  
    outer loop  
      vertex 15.000000 0.000000 0.000000  
      vertex 14.854021 2.087596 0.000000  
      vertex 14.854021 2.087596 50.000000  
    endloop  
  endfacet  
  facet normal 0.978148 0.207912 0.000000  
    outer loop  
      vertex 14.854021 2.087596 50.000000  
      vertex 14.418925 4.134560 0.000000  
      vertex 14.418925 4.134560 50.000000  
    endloop  
  endfacet  
  facet normal 0.978148 0.207912 -0.000000  
    outer loop  
      vertex 14.854021 2.087596 50.000000  
      vertex 14.418925 4.134560 0.000000  
      vertex 14.418925 4.134560 50.000000  
    endloop  
  endfacet  
endsolid
```

```
:%s/Mesh/wall
```

- stlファイルの準備

## 1. astファイルを一つにまとめる

```

up — zsh — 80x24
.          ..          VTK          constant          system
[kenta@suzukikentanoMacBook-Air vulve_sin % la down
.          constant          mix_right_m.fms system
..          face.ast          mix_right_m.stl wall.ast
VTK          mix_right.stl          outlet.ast
[kenta@suzukikentanoMacBook-Air vulve_sin % rm down/*.*
[kenta@suzukikentanoMacBook-Air vulve_sin % la
.          0          down          up
..          constant          system
[kenta@suzukikentanoMacBook-Air vulve_sin % la down
.          VTK          face.ast          system
..          constant          outlet2.ast          wall.ast
[kenta@suzukikentanoMacBook-Air vulve_sin % vim down/face.ast
[kenta@suzukikentanoMacBook-Air vulve_sin % vim down/*.ast
3 個のファイルが編集を控えています
[kenta@suzukikentanoMacBook-Air vulve_sin % vim up/*.ast
3 個のファイルが編集を控えています
[kenta@suzukikentanoMacBook-Air vulve_sin % cd down
[kenta@suzukikentanoMacBook-Air down % cat *.ast > mix.stl
[kenta@suzukikentanoMacBook-Air down % la
.          VTK          face.ast          outlet2.ast          wall.ast
..          constant          mix.stl          system
[kenta@suzukikentanoMacBook-Air down % cd ../up
[kenta@suzukikentanoMacBook-Air up % cat *.ast > mix.stl

```



## 2. cadは寸法がmmで設定されているため、mに変換(openfoamの機能を使用)

```

vulve_sin — com.docker.cli < docker run --rm -t -i --user=501:20 --volum...

kenta@suzukikentanoMacBook-Air vulve_sin % vim up/*.ast
3 個のファイルが編集を控えています
kenta@suzukikentanoMacBook-Air vulve_sin % cd down
kenta@suzukikentanoMacBook-Air down % cat *.ast > mix.stl
kenta@suzukikentanoMacBook-Air down % la
.          VTK          face.ast          outlet2.ast      wall.ast
..         constant    mix.stl          system
kenta@suzukikentanoMacBook-Air down % cd ../up
kenta@suzukikentanoMacBook-Air up % cat *.ast > mix.stl
kenta@suzukikentanoMacBook-Air up % cd ..
kenta@suzukikentanoMacBook-Air vulve_sin % openfoam2306-run
-----
=====
\\      /  F ield      | OpenFOAM in a container [from OpenCFD Ltd.]
\\      /  O peration  |
\\      /  A nd        | www.openfoam.com
\\      /  M anipulation|
-----
Release notes:  https://www.openfoam.com/news/main-news/openfoam-v2306
Documentation:   https://www.openfoam.com/documentation/
Issue Tracker:  https://develop.openfoam.com/Development/openfoam/issues/
Local Help:     more /openfoam/README
-----
System   :  Ubuntu 22.04.2 LTS   (admin user: sudofoam)

```

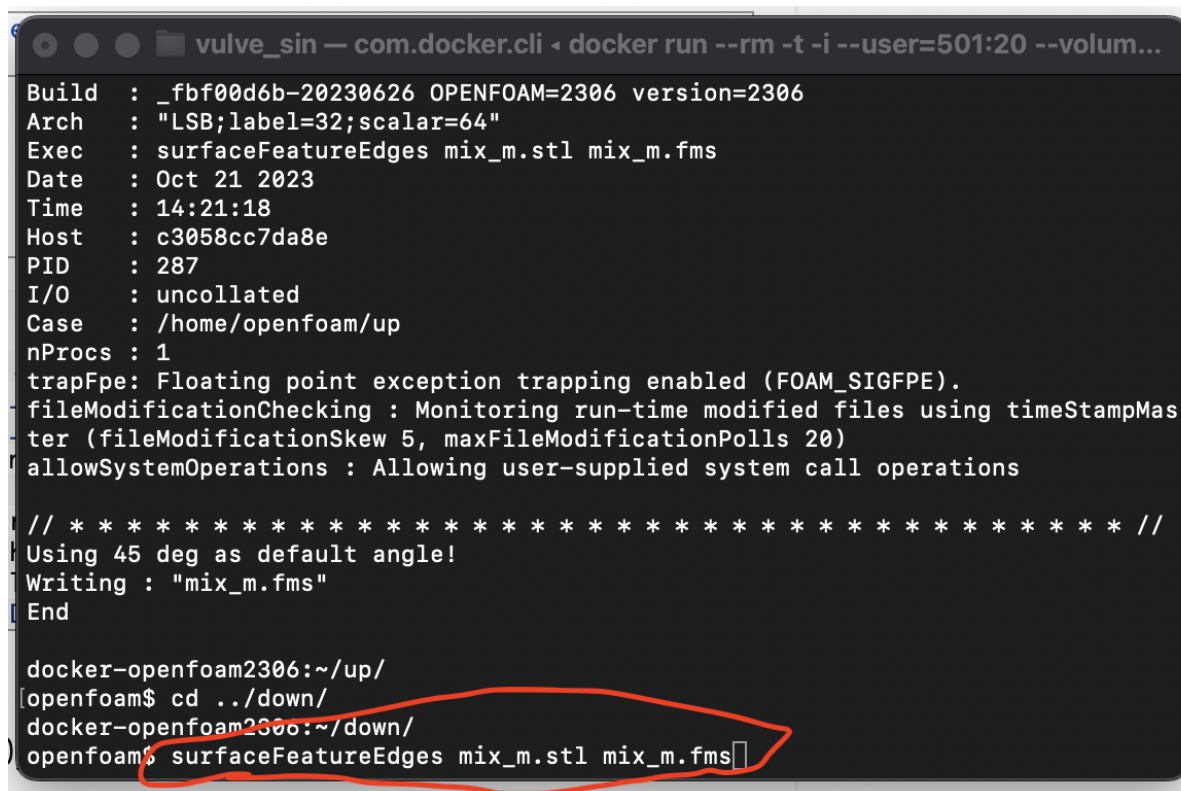
```

vulve_sin — com.docker.cli < docker run --rm -t -i --user=501:20 --volum...

openfoam$ surfaceC
surfaceCheck      surfaceClean      surfaceCoarsen    surfaceConvert
docker-openfoam2306:~/
openfoam$ surfaceC
surfaceCheck      surfaceClean      surfaceCoarsen    surfaceConvert
docker-openfoam2306:~/
openfoam$ surfaceC
surfaceCheck      surfaceClean      surfaceCoarsen    surfaceConvert
docker-openfoam2306:~/
openfoam$ surfaceCo
surfaceCoarsen    surfaceConvert
docker-openfoam2306:~/
openfoam$ surfaceCo
surfaceCoarsen    surfaceConvert
docker-openfoam2306:~/
openfoam$ surfaceCo
surfaceCoarsen    surfaceConvert
docker-openfoam2306:~/
openfoam$ cd down/
docker-openfoam2306:~/down/
openfoam$ surfaceConvert -scale 0.001 mix.stl mix_m.stl

```

### 3. 特徴線を抽出する(綺麗にメッシュが切れるようになる操作という理解でOK)



```

vulve_sin — com.docker.cli < docker run --rm -t -i --user=501:20 --volum...

Build   : _fbf00d6b-20230626 OPENFOAM=2306 version=2306
Arch    : "LSB;label=32;scalar=64"
Exec    : surfaceFeatureEdges mix_m.stl mix_m.fms
Date    : Oct 21 2023
Time    : 14:21:18
Host    : c3058cc7da8e
PID     : 287
I/O     : uncollated
Case    : /home/openfoam/up
nProcs  : 1
trapFpe: Floating point exception trapping enabled (FOAM_SIGFPE).
fileModificationChecking : Monitoring run-time modified files using timeStampMas
ter (fileModificationSkew 5, maxFileModificationPolls 20)
allowSystemOperations : Allowing user-supplied system call operations

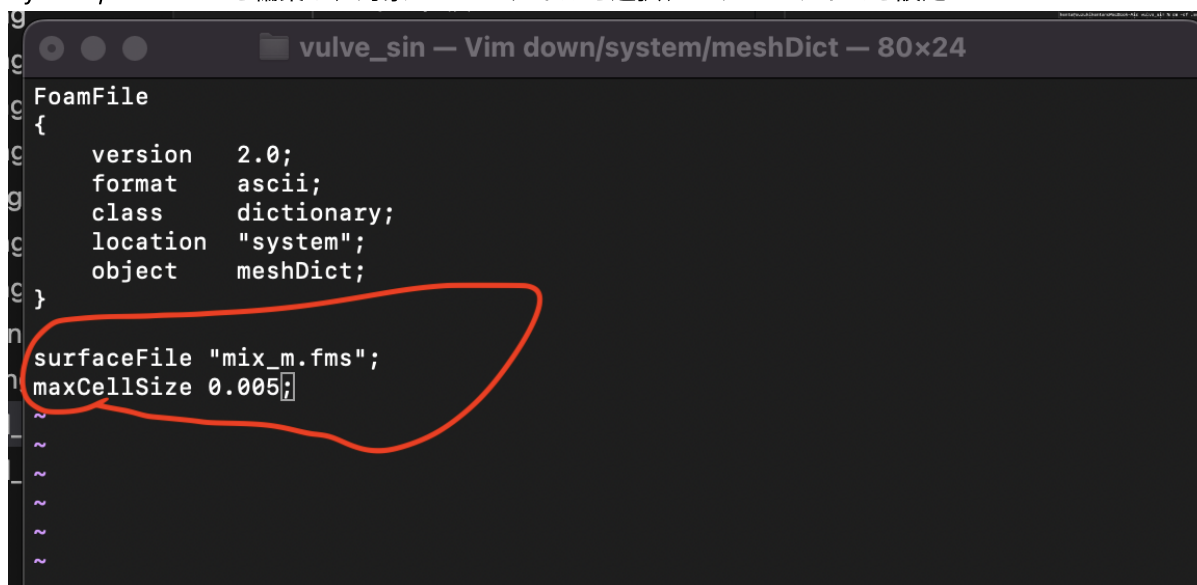
// * * * * *
Using 45 deg as default angle!
Writing : "mix_m.fms"
End

docker-openfoam2306:~/up/
openfoam$ cd ../down/
docker-openfoam2306:~/down/
openfoam$ surfaceFeatureEdges mix_m.stl mix_m.fms

```

- メッシュを作成

#### 1. system/meshDictを編集し、対象のfmsファイルを選択、メッシュサイズを設定



```

vulve_sin — Vim down/system/meshDict — 80x24

FoamFile
{
  version      2.0;
  format       ascii;
  class        dictionary;
  location     "system";
  object       meshDict;
}

surfaceFile "mix_m.fms";
maxCellSize 0.005;

```

## 2. 任意のメッシャーでメッシュを作成(今回はpMesh)

```

vulve_sin — com.docker.cli < docker run --rm -t -i --user=501:20 --volum...

Starting smoothing the mesh
Starting untangling the mesh
Iteration 0. Number of bad faces is 0
Finished untangling the mesh
Finished smoothing the mesh
Iteration 0. Number of bad faces is 0
Starting untangling the mesh
Iteration 0. Number of bad faces is 0
Finished untangling the mesh
Renumbering the mesh
Finished renumbering the mesh
Renaming boundary patches
Finished renaming boundary patches
ExecutionTime = 0.3 s  ClockTime = 0 s

End

docker-openfoam2306:~/up/
[openfoam$ cd ..
docker-openfoam2306:~/
[openfoam$ ls
0 constant down system up
docker-openfoam2306:~/
openfoam$ pMesh ]

```

## 3. 個別のメッシュをマージ①マージ対象のメッシュ情報を移動②マージコマンドを実行

```

vulve_sin — com.docker.cli < docker run --rm -t -i --user=501:20 --volum...

System   : Ubuntu 22.04.2 LTS (admin user: sudofoam)
OpenFOAM : /usr/lib/openfoam/openfoam2306
Build    : _fbf00d6b-20230626 OPENFOAM=2306 patch=0

Note
  Different OpenFOAM components and modules may be present (or missing)
  on any particular container installation.
  Eg, source code, tutorials, in-situ visualization, paraview plugins,
  external linear-solver interfaces etc.

-----
docker-openfoam2306: /
[openfoam$ cp -r up/constant/polyMesh constant/ ①
docker-openfoam2306:~/
[openfoam$ merge
mergeMeshes mergeOrSplitBaffles mergeSurfacePatches
docker-openfoam2306:~/
[openfoam$ mergeMeshes . down -overwrite ②
/*-----*/

```

- a
- a
- a

sa