

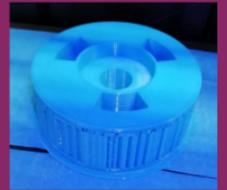
# Tutoriel StarCCM+ pour UEI Eolienne

Exportation du fichier de python à Catia



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LIFSE  
Arts et Metiers  
Institute of  
Technology

Impression 3D avec le fichier stl



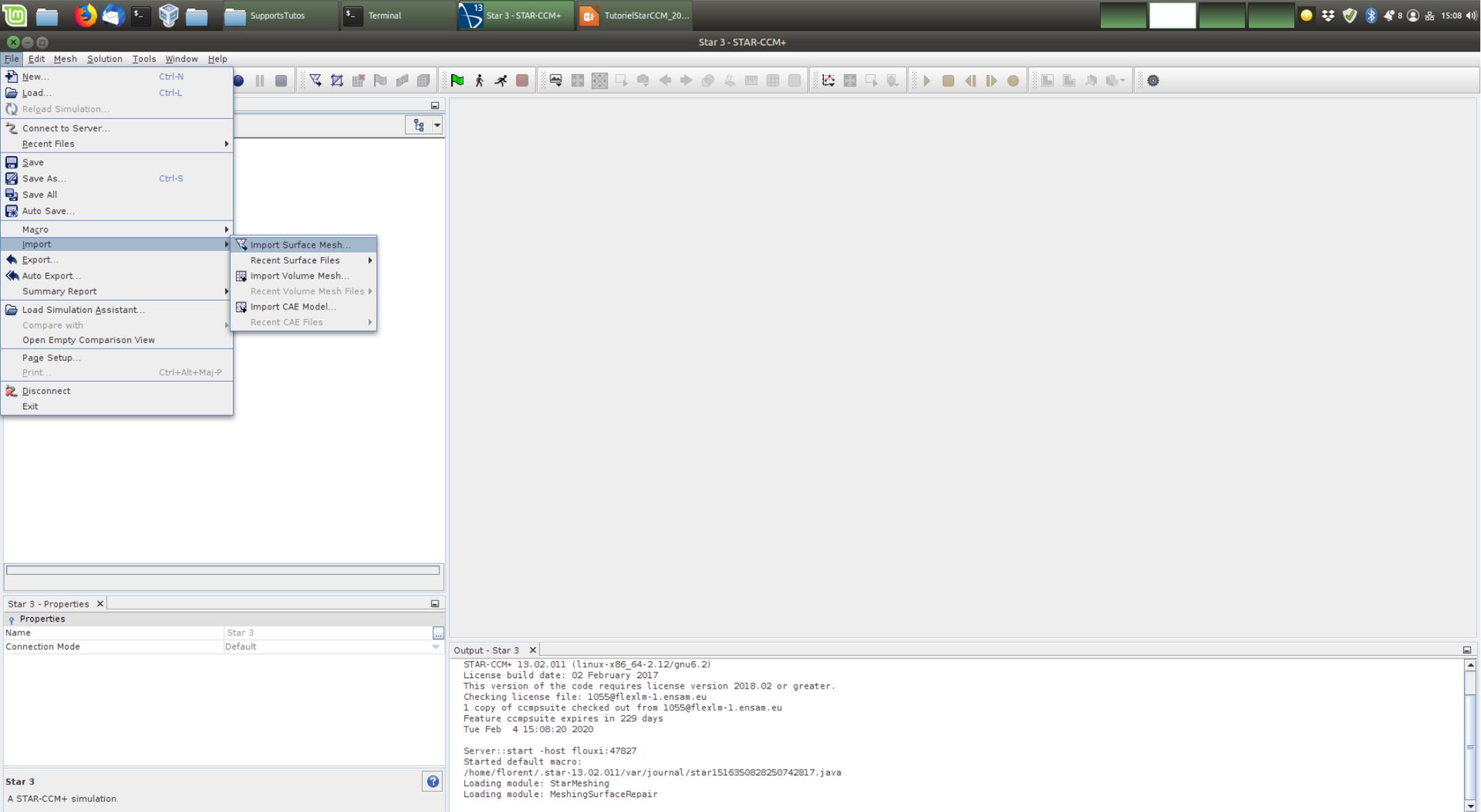
Arts Sciences et  
Technologies  
et Métiers



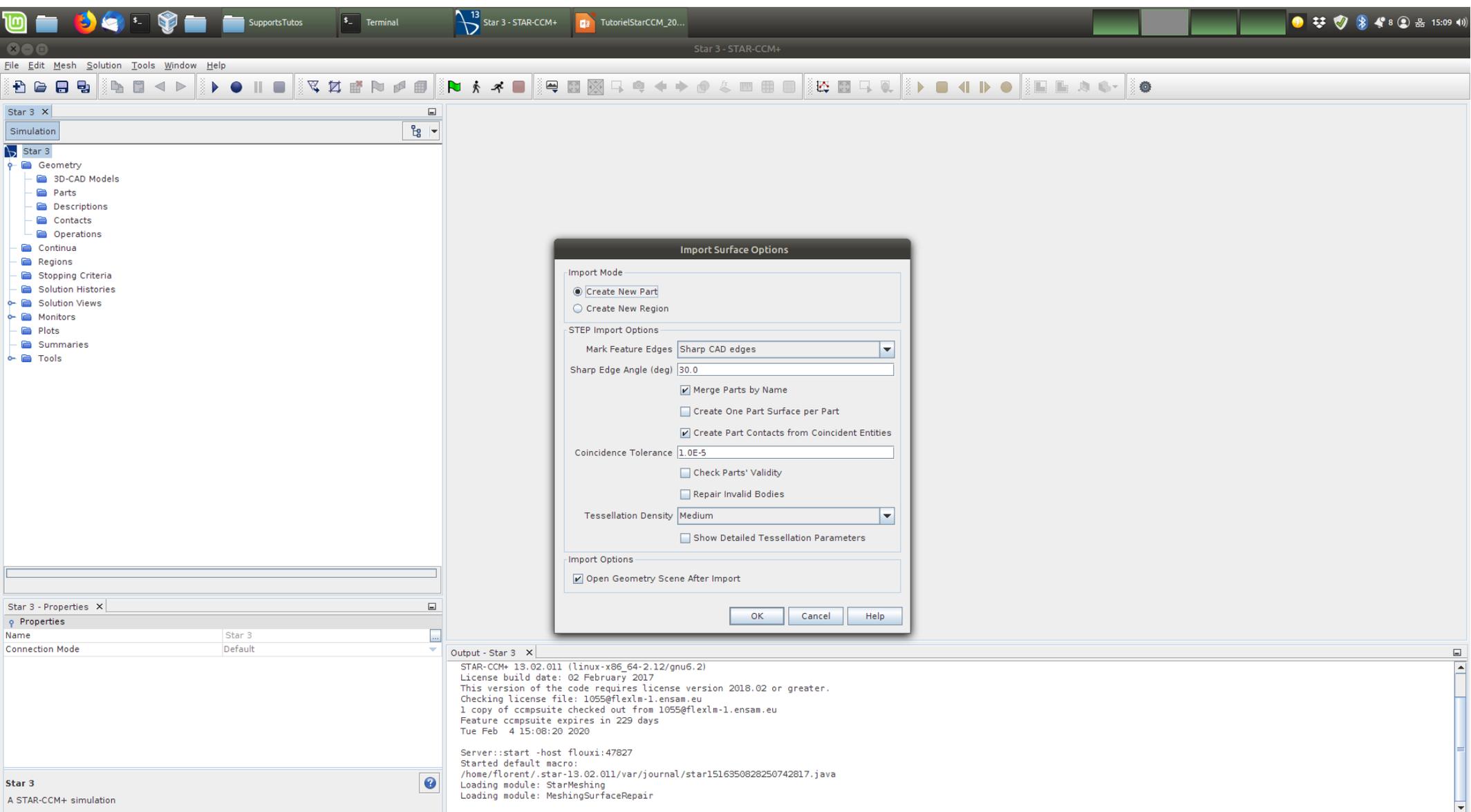
Laboratoire  
Ingénierie des Fluides  
Systèmes Énergétiques

# Création de la géométrie

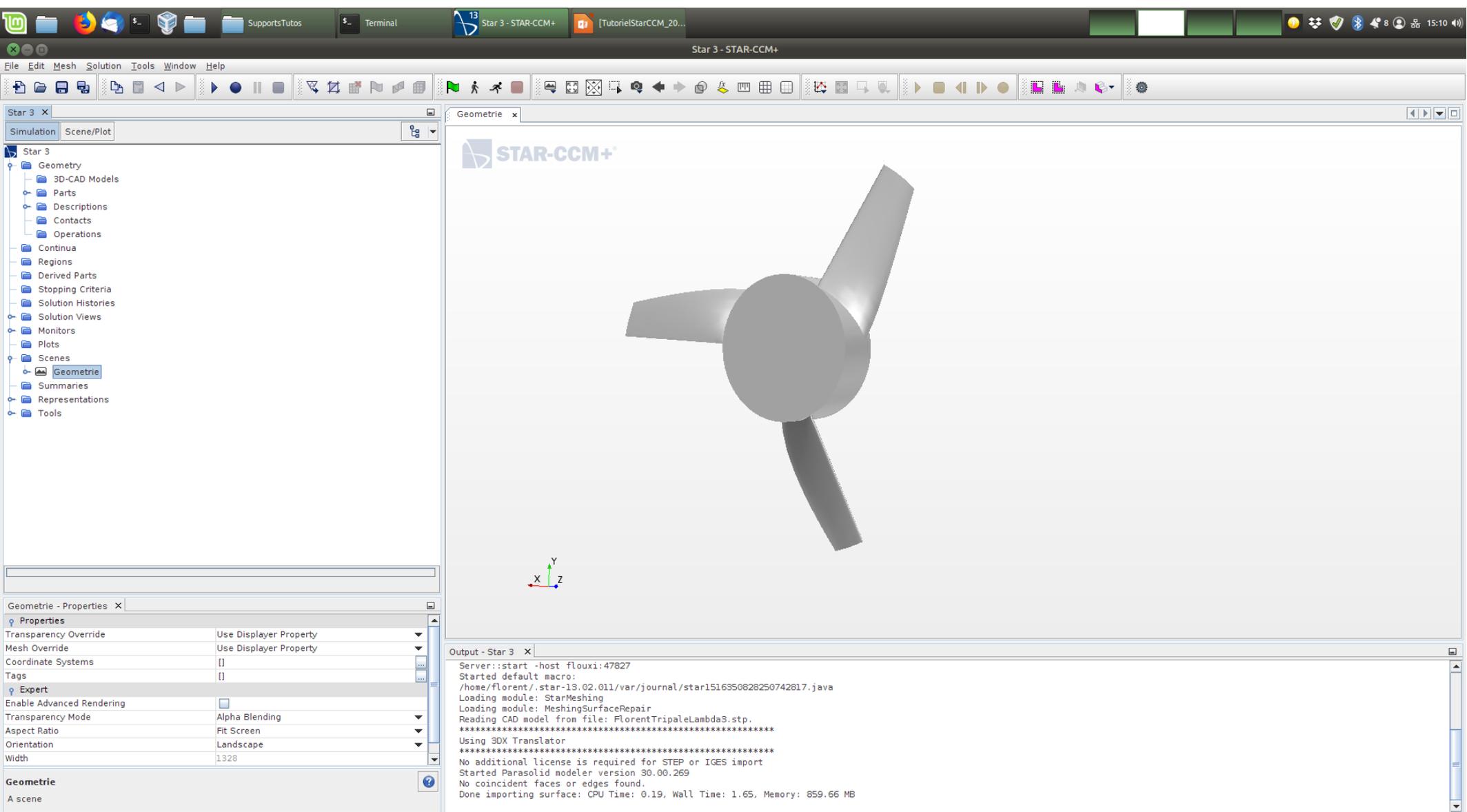
- Import du modèle CAO
- Création d'un cylindre entourant l'éolienne
- Extraction du volume occupé par le fluide par soustraction
- Découpage des frontières



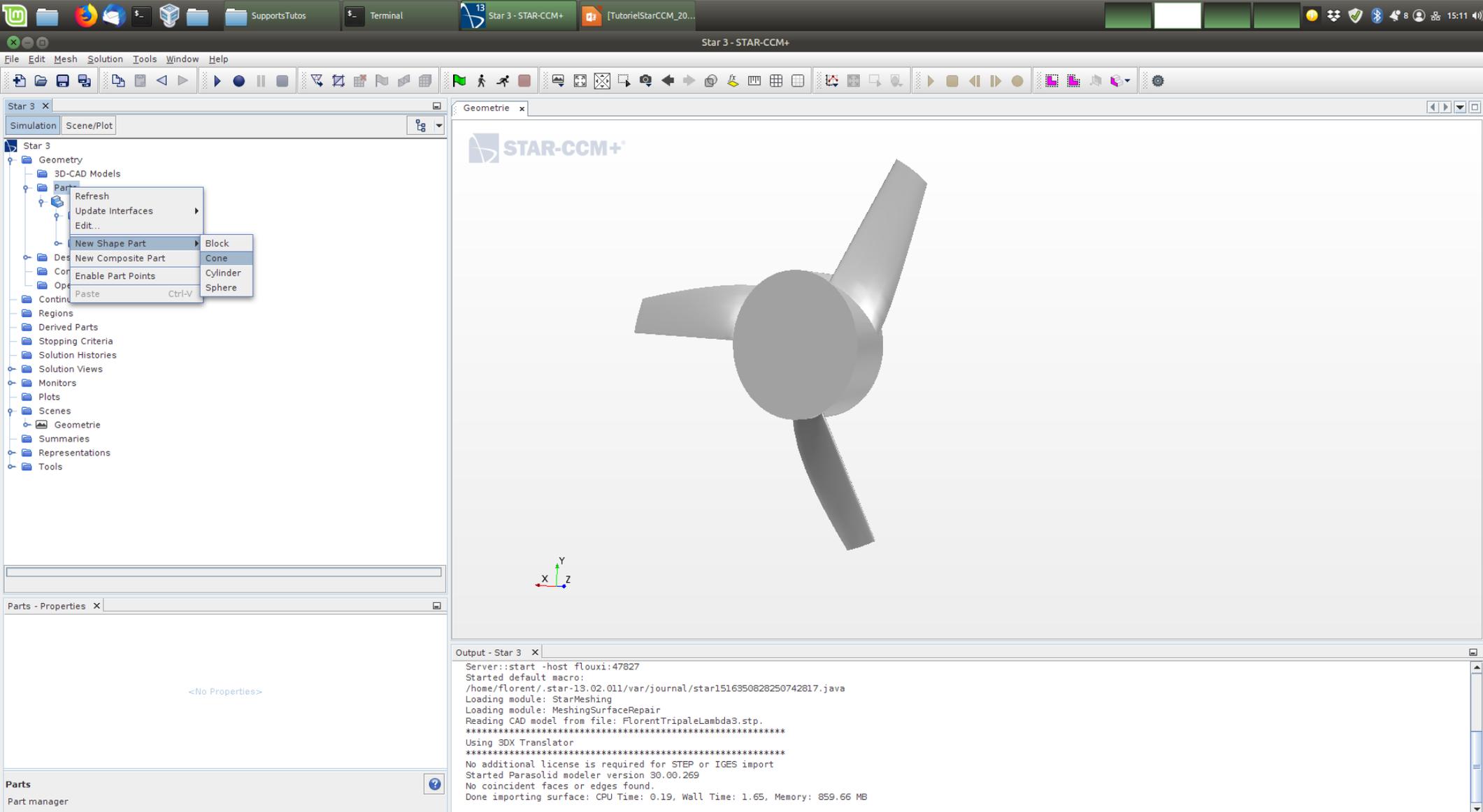
Créer une nouvelle simulation.  
Importer le fichier STEP.



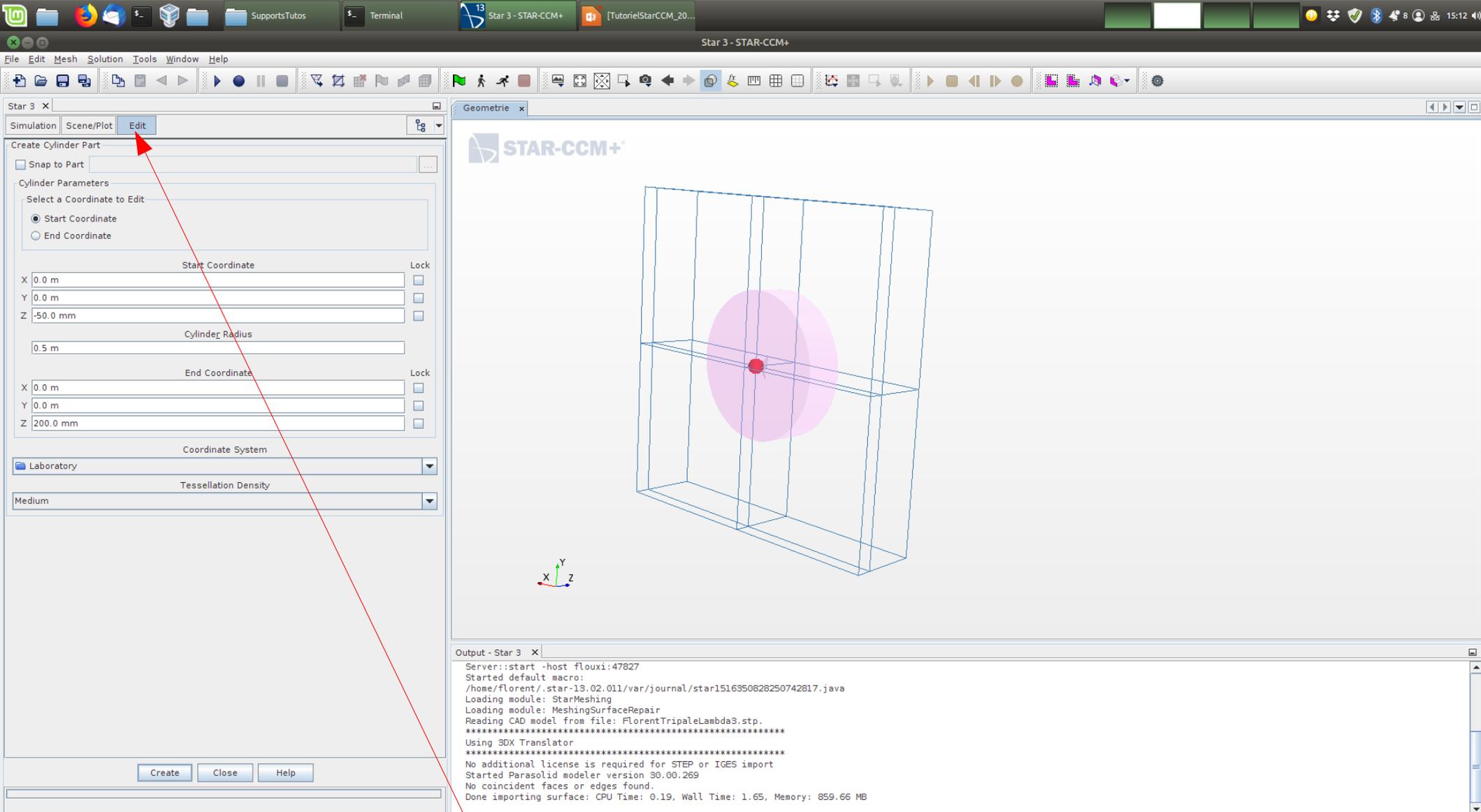
Options par défaut: création d'une "Part".



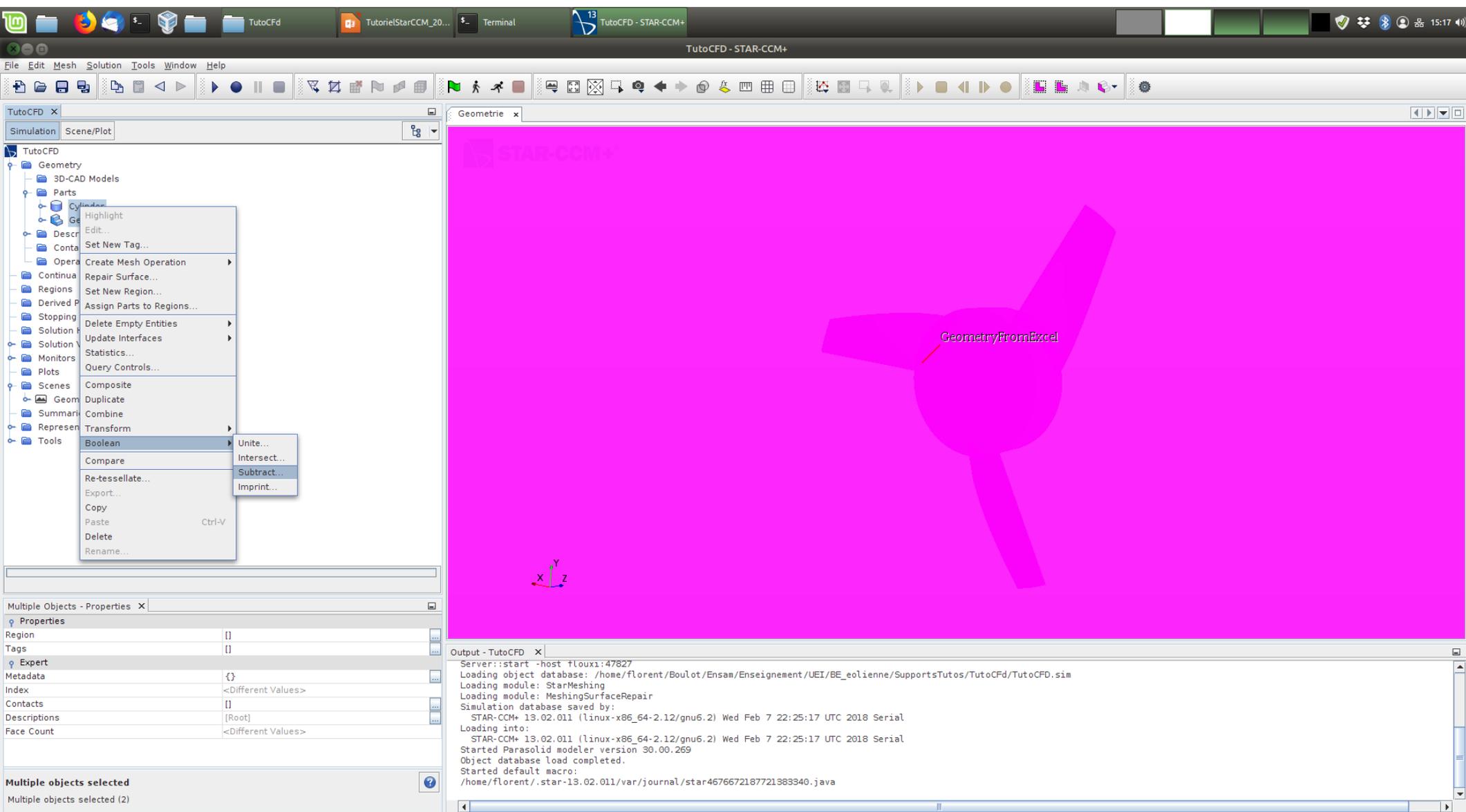
Une "Scene" s'ouvre avec la géométrie importée. On peut la renommer et orienter la vue, zoomer, ...



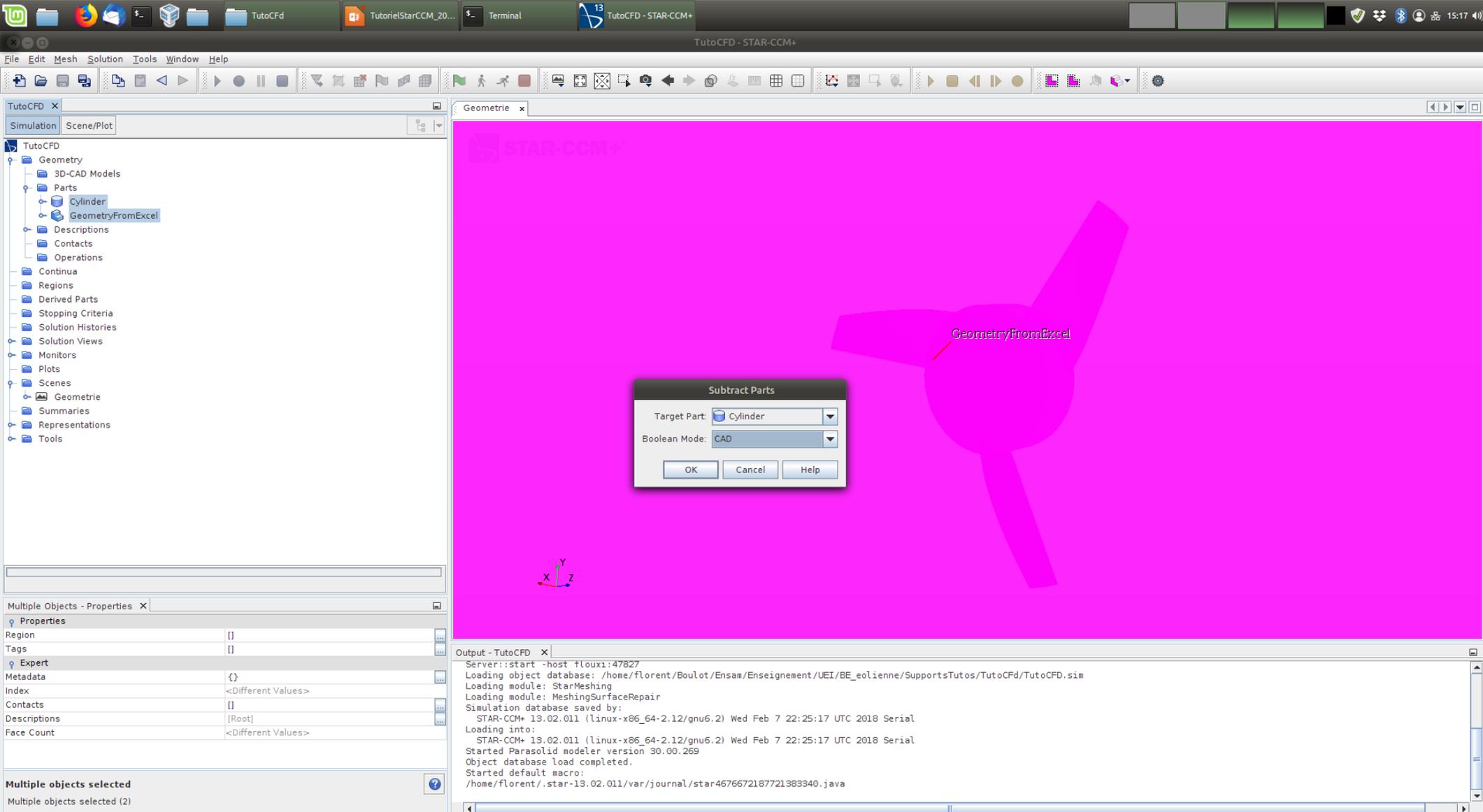
On va créer un volume cylindrique entourant l'éolienne. Clic-droit sur "Parts", puis dérouler "New Shape Parts" et choisir "Cylinder".



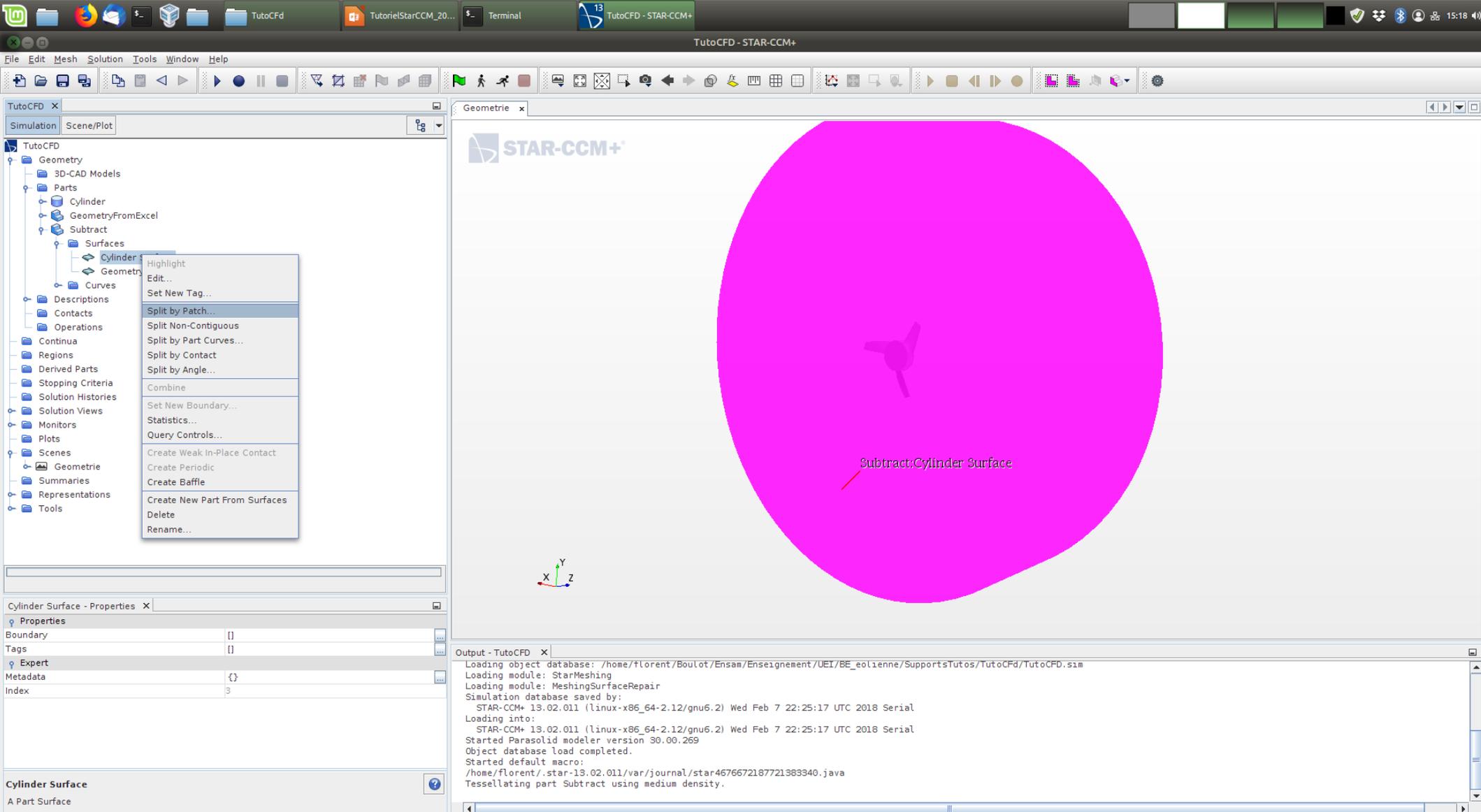
On change d'environnement ou "d'atelier".  
Modifier les paramètres de manière à avoir un cylindre de diamètre environ 5 fois le diamètre de l'éolienne et avec une extension suffisante en amont et en aval. Cliquer sur "Create" et fermer l'atelier.



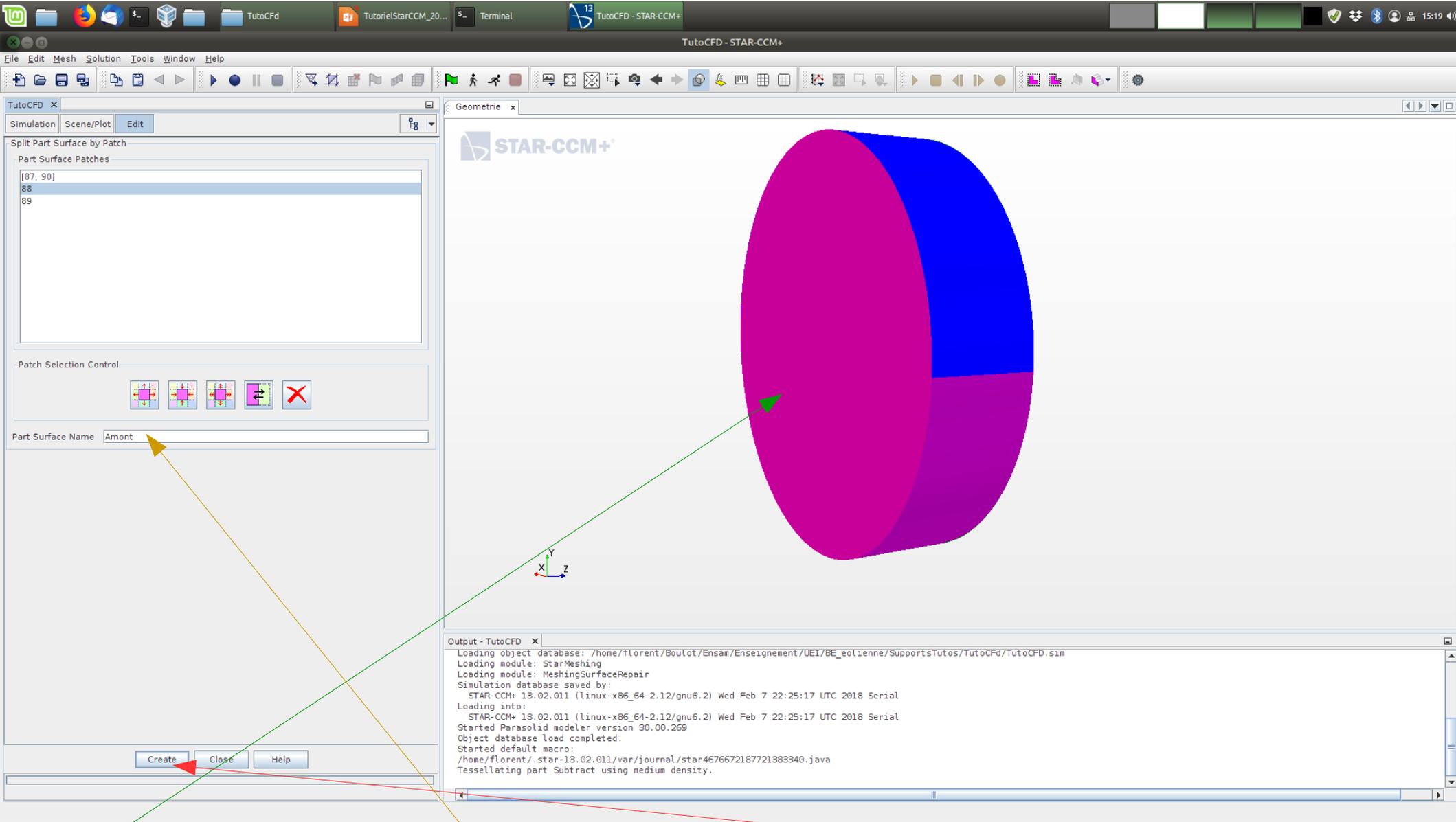
Sélectionner les deux “Parts”, clic-droit et créer une opération booléenne de soustraction.



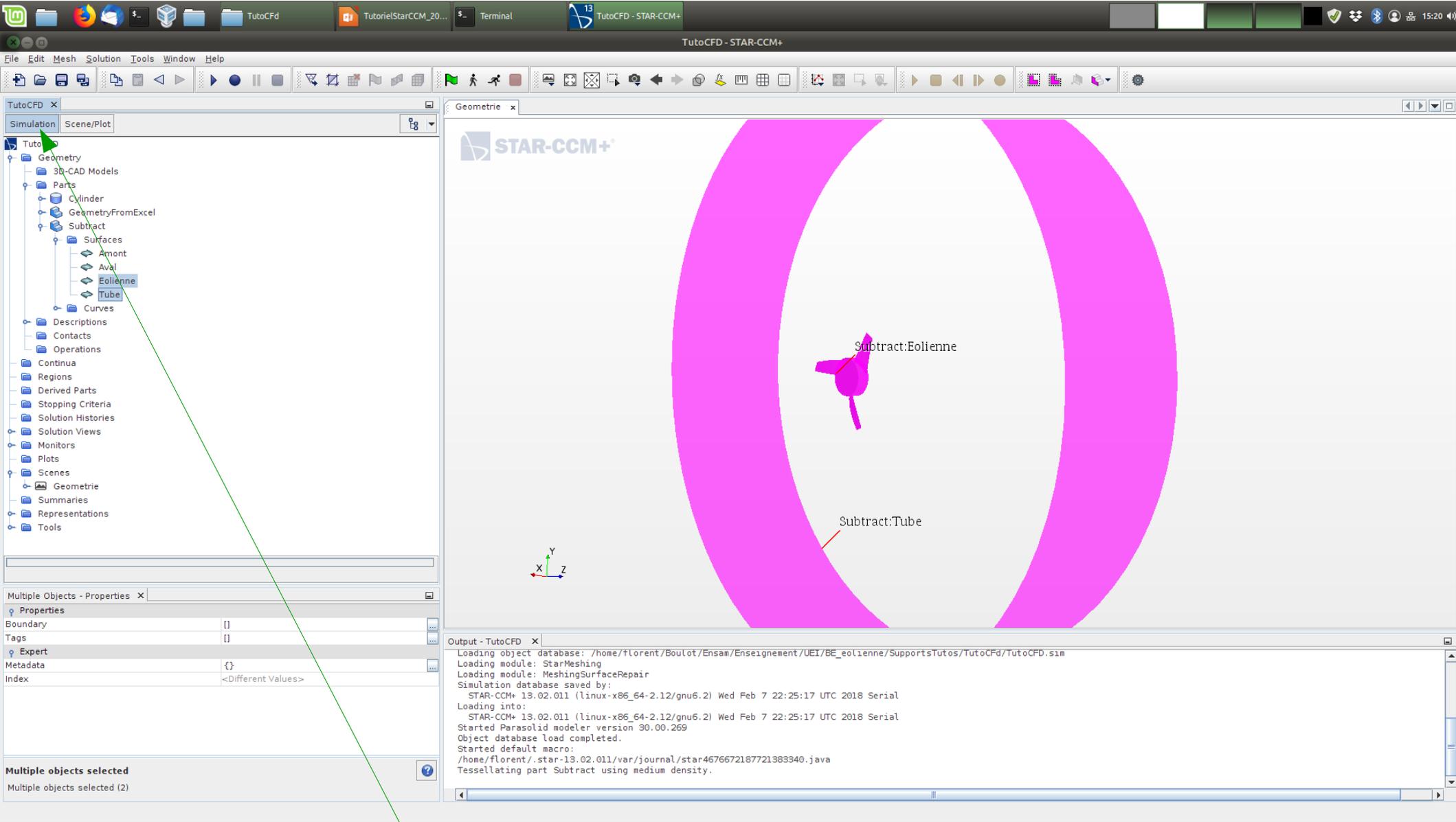
Du cylindre, on soustrait la géométrie importée pour avoir le volume occupé par le fluide. Changer le "Boolean Mode" à "CAD" et cliquer sur OK.



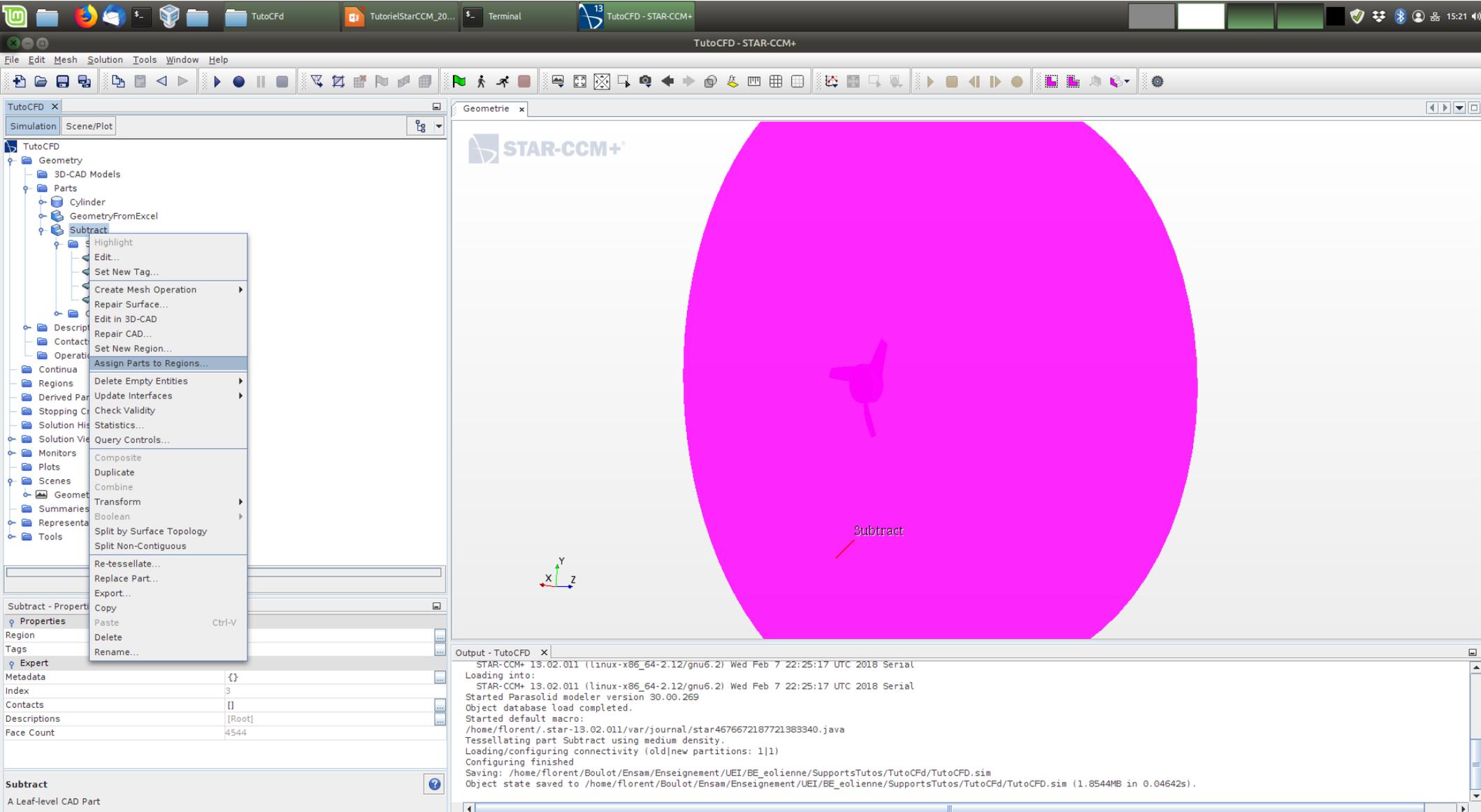
On va préparer les surfaces. Dérouler le menu "Surfaces" sous la "Part" qui doit s'appeler "Substract". Clic-droit et choisir "Split by Patch".  
On va alors changer d'environnement/ "d'atelier".



Cliquer sur la surface d'entrée, la renommer, puis cliquer sur "Create".  
Idem pour la surface de sortie.  
Enfin, cliquer sur "Close" pour quitter cet atelier.

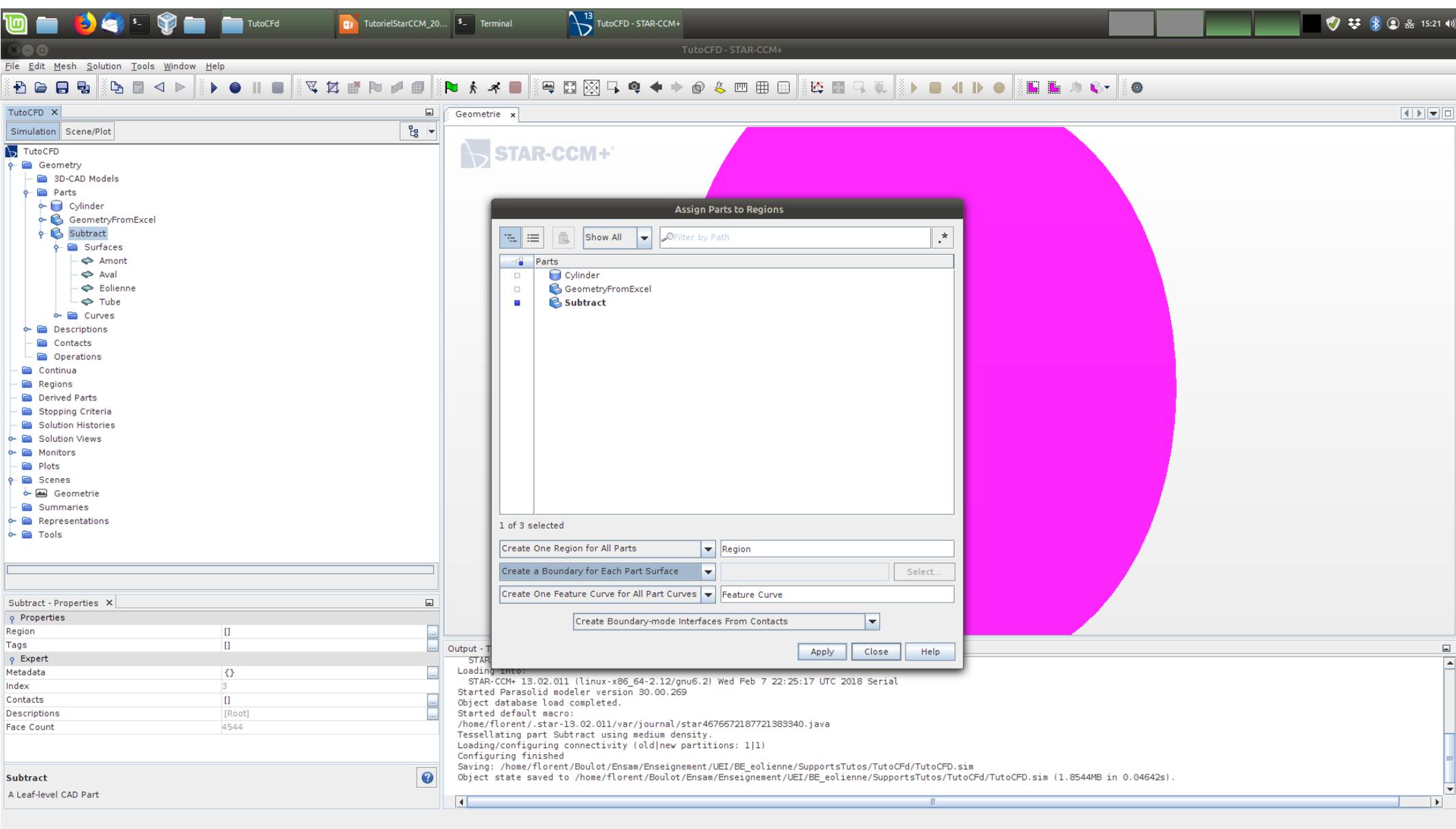


De retour dans l'onglet "Simulation".  
On vérifie dans l'arborescence que l'on a bien décomposé la surface entourant le volume en 4, et que les noms sont suffisamment explicites pour que l'on puisse s'y retrouver.



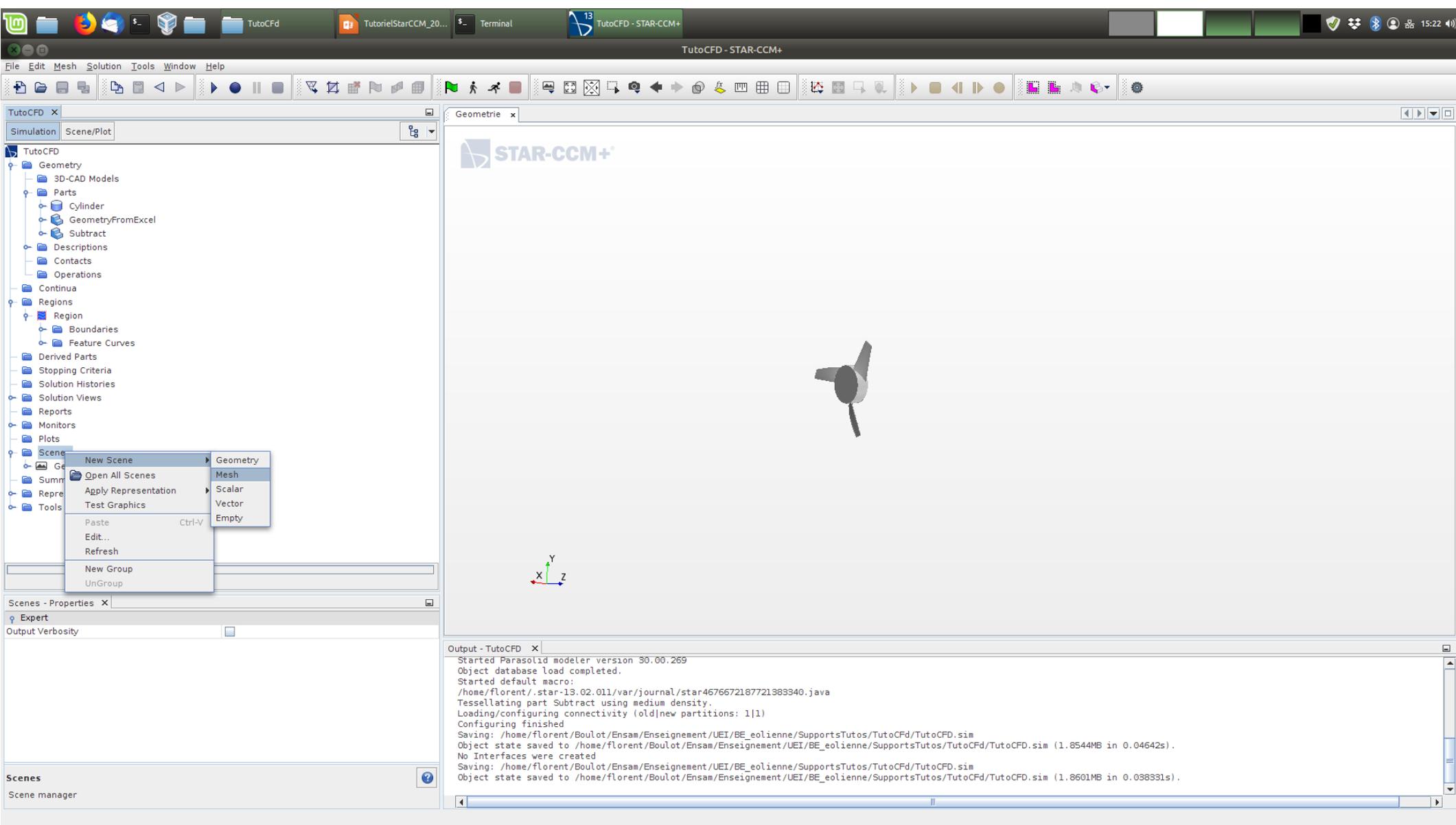
On va créer une “Region”: sous StarCCM+, les modèles et les conditions aux limites s’appliquent sur des “Regions”.

Clic-droit sur l’entité géométrique “Substract”, puis choisir “Assign Parts to Regions”.

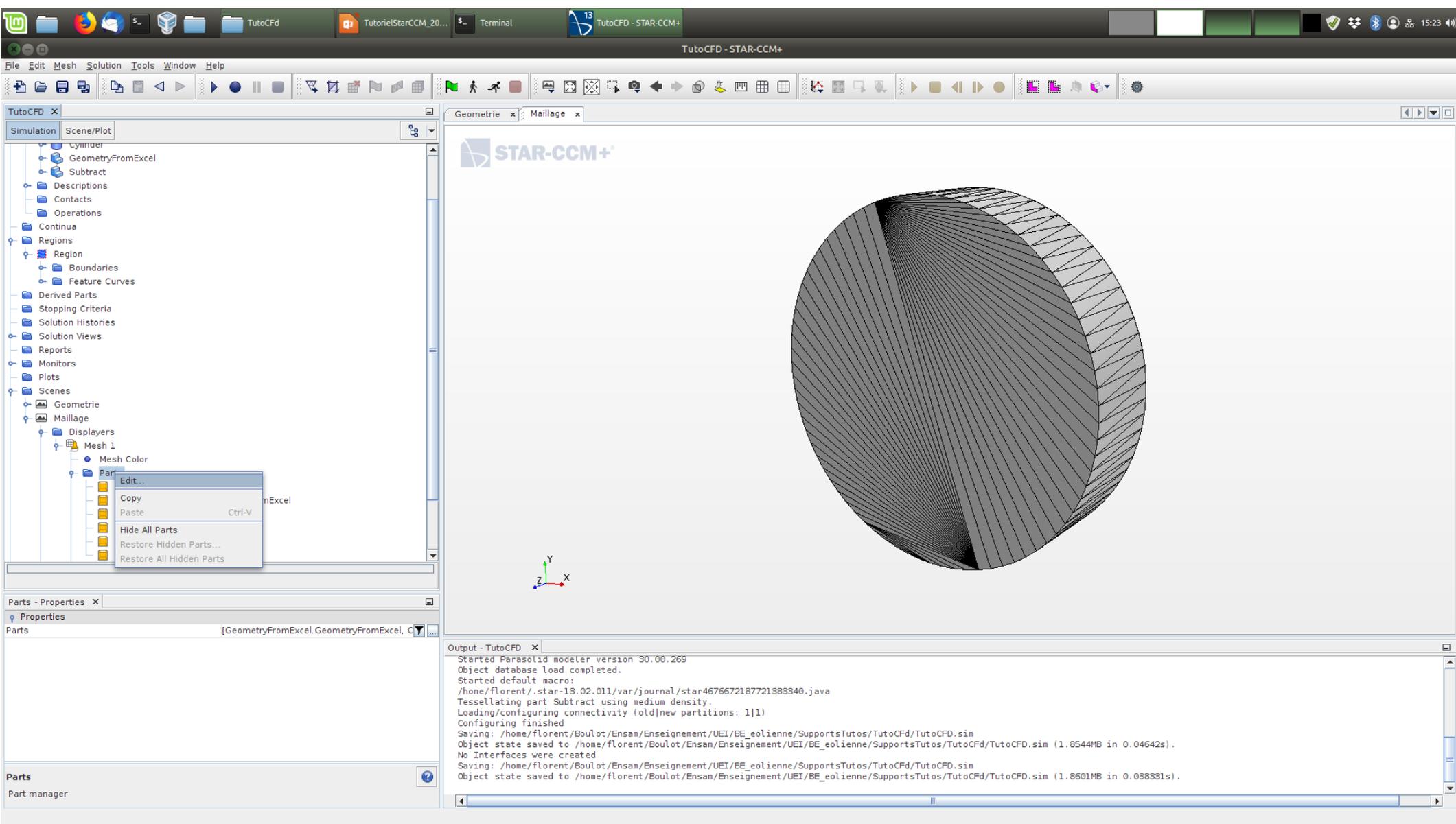


Choisir le bon volume, et prendre l'option "Create a Boundary for Each Part Surface" afin de conserver notre pré-découpage (en 4) de la surface entourant le volume.

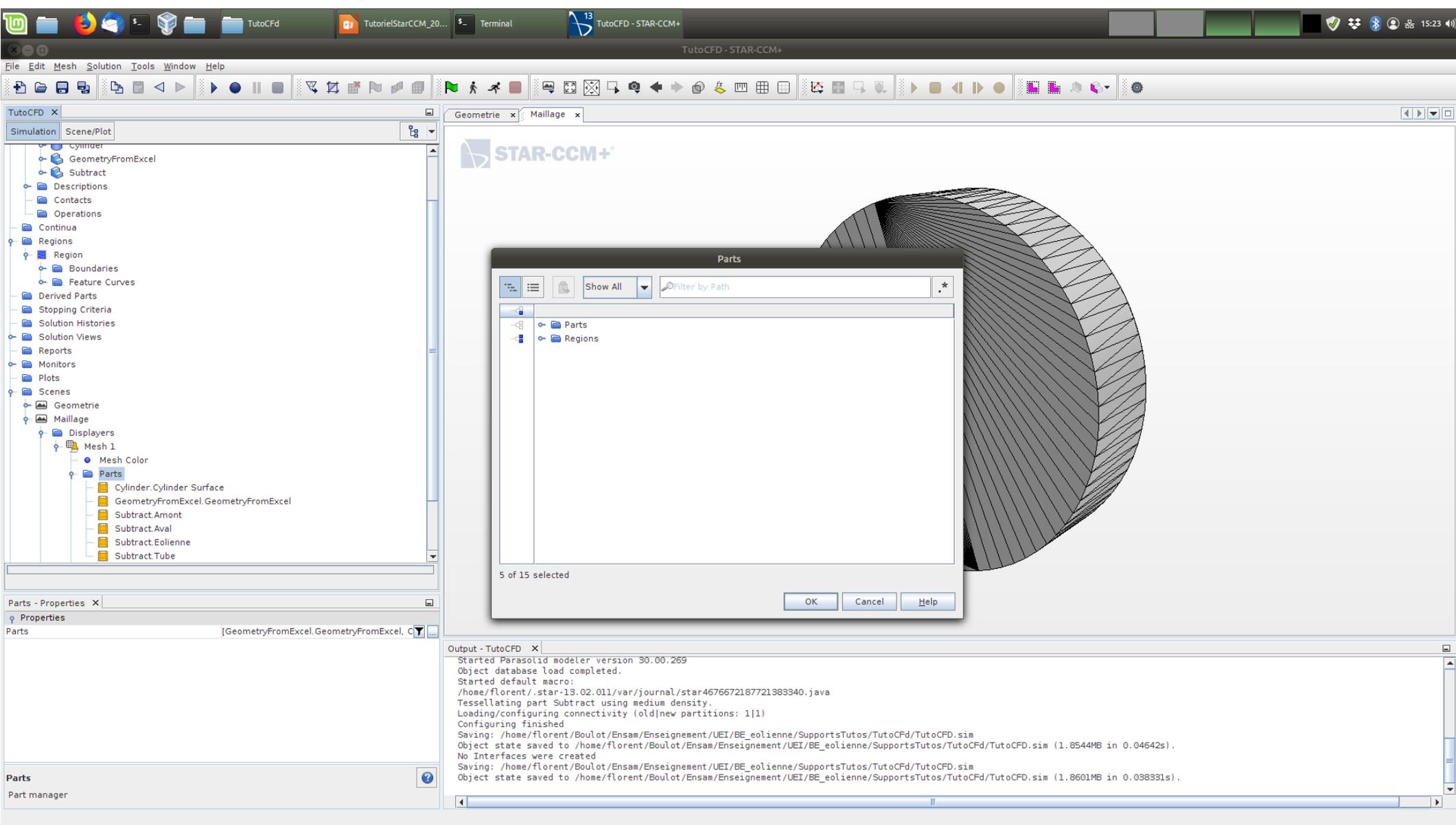
# Maillage



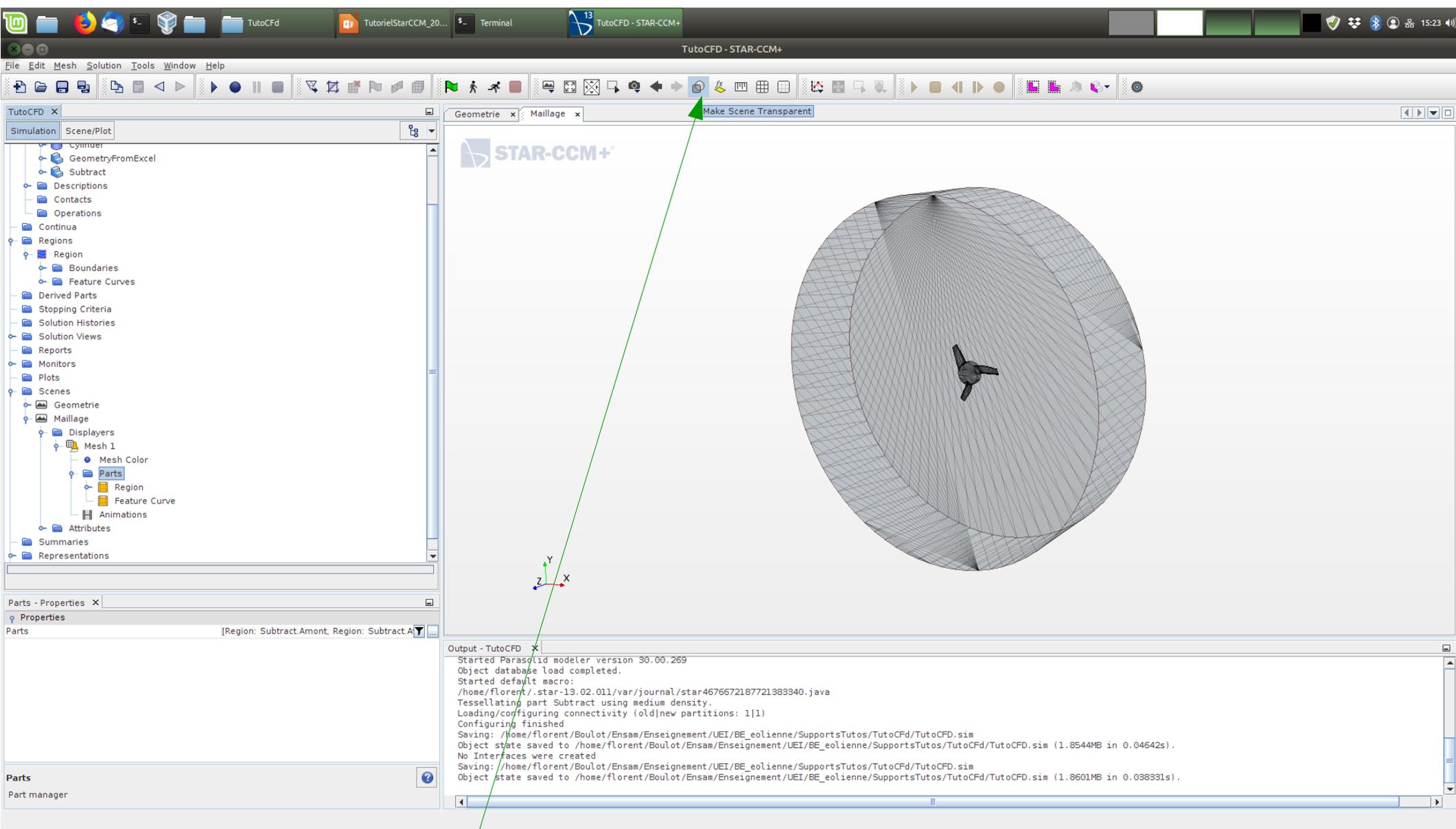
Pour la visualisation, on va créer une nouvelle “Scene” de type “Mesh”.



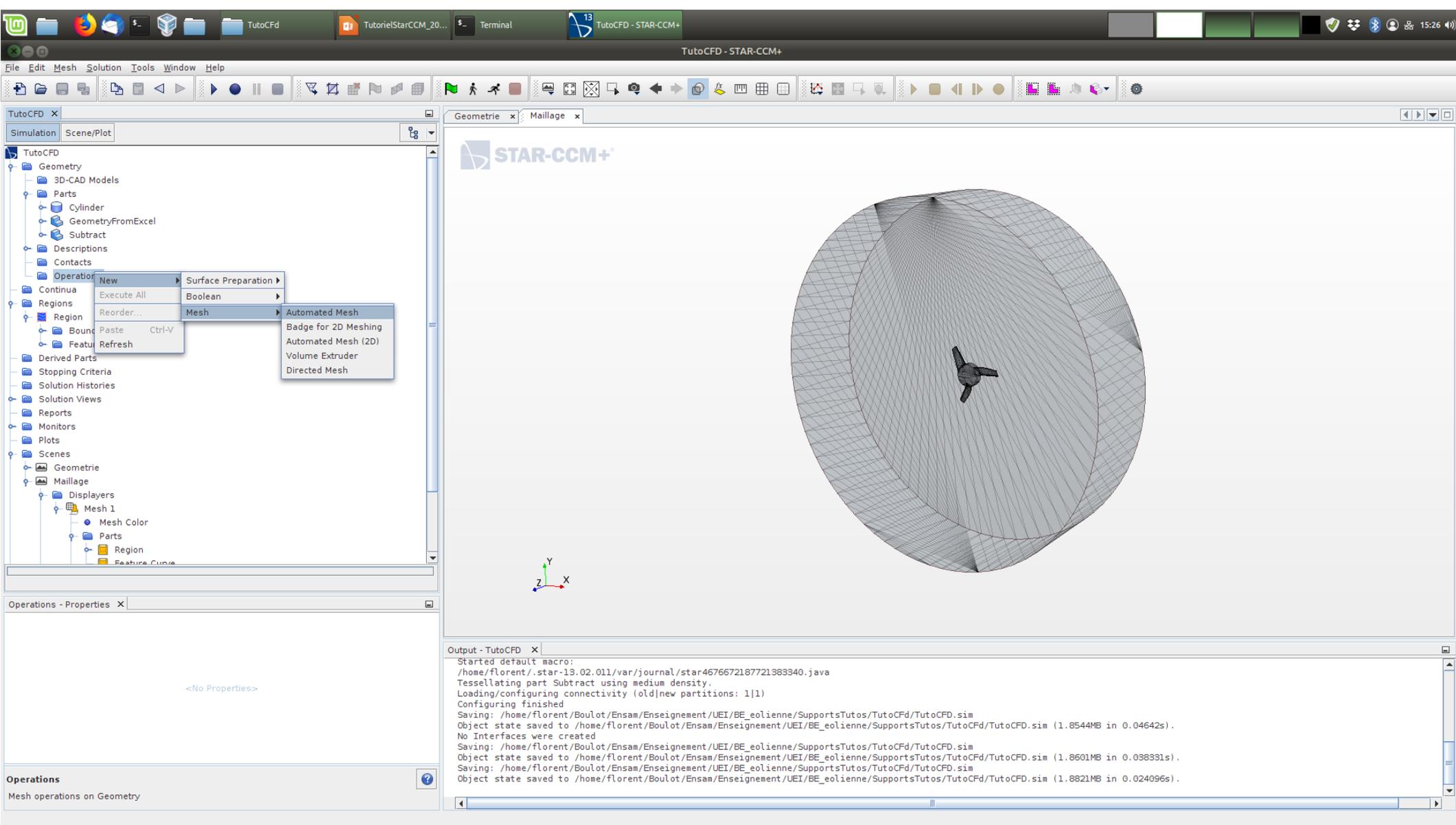
Il s'agit d'un maillage de type CAO. Dérouler le menu pour voir les options d'affichage.



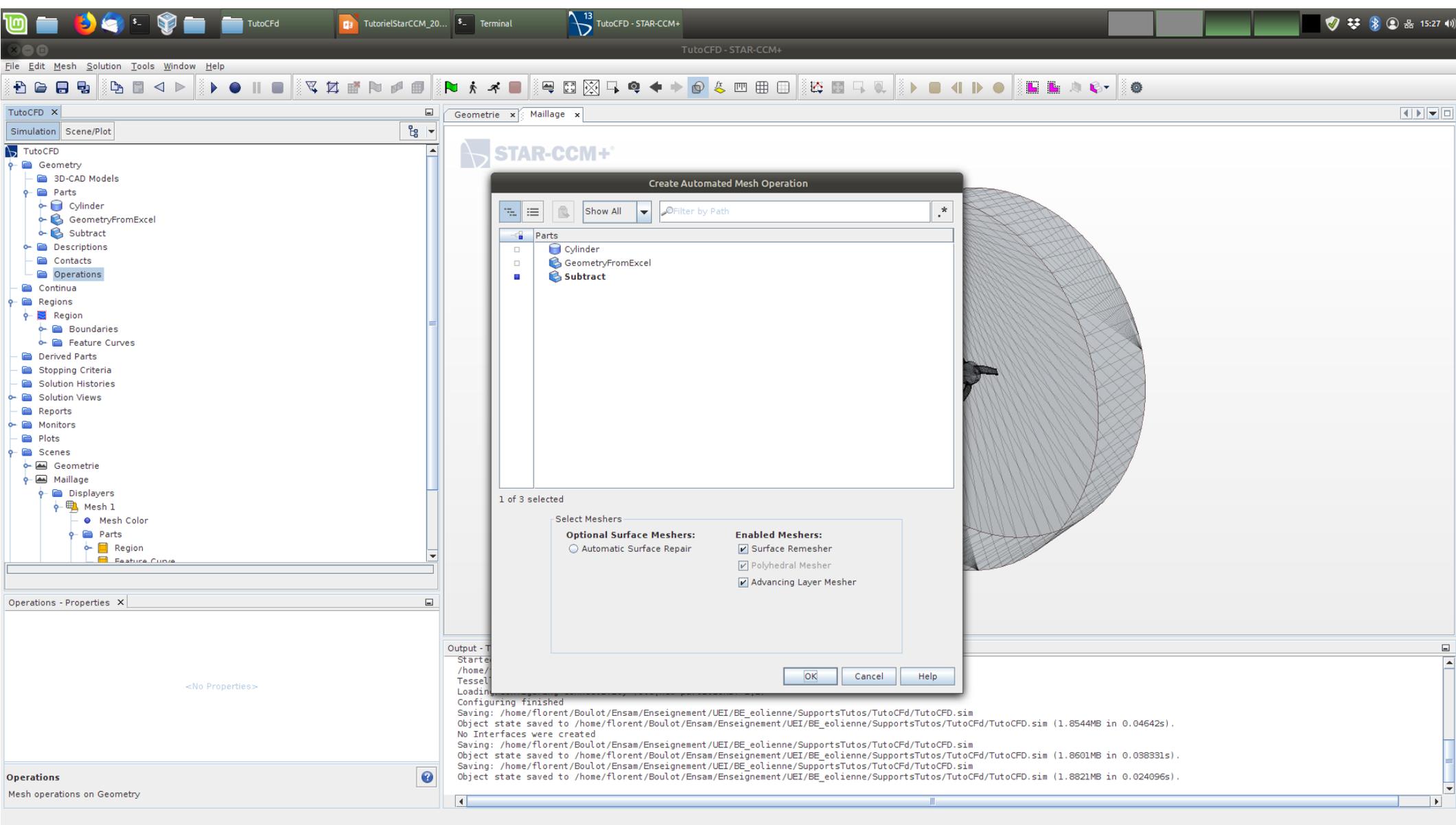
On propose ici d'afficher le maillage de la "Region" et non de la "Part" (par défaut).



On peut rendre la "Scene" transparente. C'est plus joli.



On va créer le maillage: dans "Geometry", "Operation", clic-droit "New", "Mesh", choisir "Automated Mesh".



Choisir le volume que l'on va mailler, puis sélectionner les "Meshers": "Surface Remesher", "Polyhedral Mesher" et "Advancing Layer Mesher".

The screenshot displays the STAR-CCM+ software interface. The main window shows a 3D model of a rotor with a fine mesh. The left sidebar contains a tree view of the simulation setup, including Geometry, Meshers, and Default Controls. The 'Base Size' property is highlighted in the tree view. Below the tree view, the 'Base Size - Properties' dialog is open, showing the 'Value' set to 1.0 m. The bottom panel shows the output log with the following text:

```
Output - TutoCFD x
Loading module: MeshingSurfaceRepair
Loading module: StarResurfacer
Loading module: StarDualMesher
Loading module: StarBodyFittedMesher
Simulation database saved by:
STAR-CCM+ 13.02.011 (linux-x86_64-2.12/gnu6.2) Wed Feb 7 22:25:17 UTC 2018 Serial
Loading into:
STAR-CCM+ 13.02.011 (linux-x86_64-2.12/gnu6.2) Wed Feb 7 22:25:17 UTC 2018 Np=10
Started Parasolid modeler version 30.00.269
Object database load completed.
Started default macro:
/home/florent/.star-13.02.011/var/journal/star4063584906381.668693.java
```

Choisir une “Base Size” adaptée (par exemple 10mm pour un rotor de rayon 100mm).

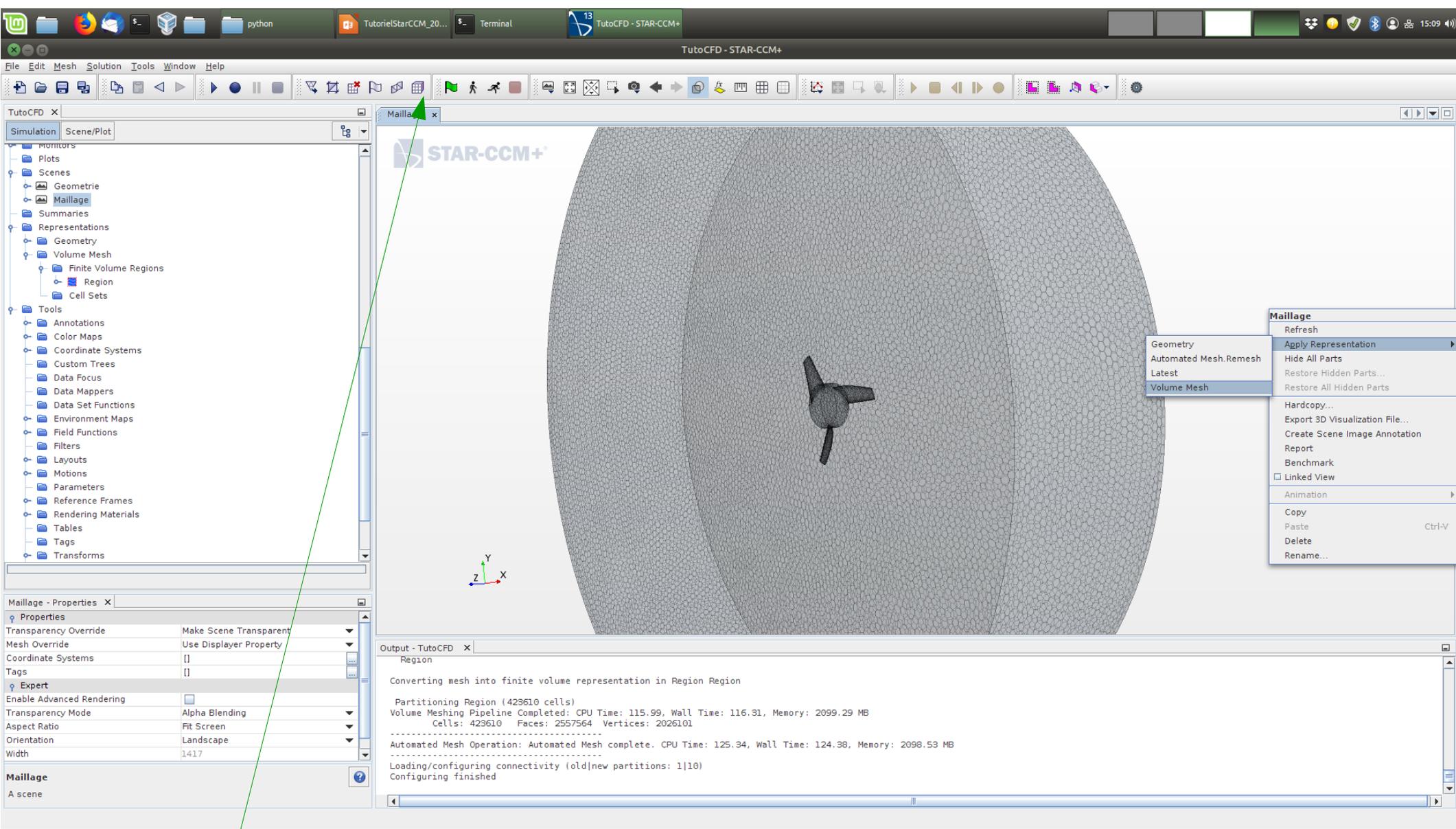
The screenshot shows the STAR-CCM+ software interface. The main window displays a 3D model of a sphere with a propeller inside, meshed with a structured grid. The left sidebar shows the 'Automated Mesh' tree, with 'Prism Layer Total Thickness' selected. Below the sidebar, the 'Prism Layer Total Thickness - Properties' table is visible:

Property	Value
Size Type	Relative to base
Percentage of Base	25.0
Absolute Size	0.0025 m

The bottom panel shows the output log with the following text:

```
Output - TutoCFD x
Loading module: MeshingSurfaceRepair
Loading module: StarResurfacr
Loading module: StarDualMesher
Loading module: StarBodyFittedMesher
Simulation database saved by:
STAR-CCM+ 13.02.011 (linux-x86_64-2.12/gnu6.2) Wed Feb 7 22:25:17 UTC 2018 Serial
Loading into:
STAR-CCM+ 13.02.011 (linux-x86_64-2.12/gnu6.2) Wed Feb 7 22:25:17 UTC 2018 Np=10
Started Parasolid modeler version 30.00.269
Object database load completed.
Started default macro:
/home/florent/.star-13.02.011/var/journal/star4063584906381.668693.java
```

Modifier à votre convenance les paramètres de l'extrusion prismatique (ici, on change le "Number of Prism Layers" à 4 et le "Prism Layer Total Thickness" à 25% de la "Base Size" pour extruder 4 couches à partir des surfaces sur une distance totale de 2.5mm).



**Générer le maillage.** C'est un peu long...

Pour le visualiser, ouvrir la "Scene" idoine, clic-droit dedans, et choisir "Apply Representation", "Volume Mesh".

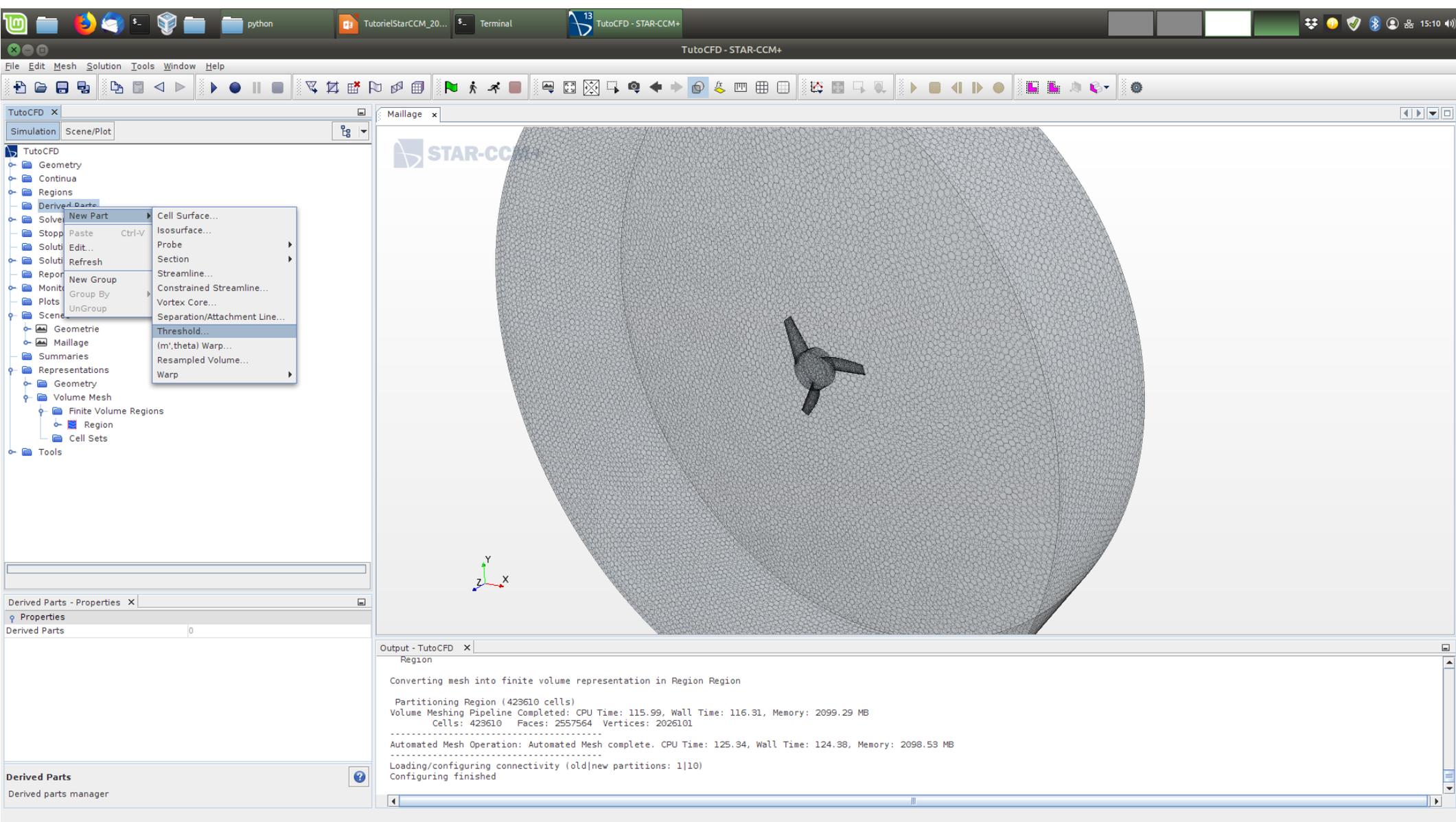
The screenshot displays the STAR-CCM+ software interface. The main window shows a 3D model of a propeller-like geometry with a fine mesh applied to it. The left sidebar contains a tree view of the simulation setup, with 'Region' selected under 'Finite Volume Regions'. The bottom-left panel, titled 'Region - Properties', shows the following data:

Property	Value
Cells	423610
Interior Faces	2557564
Vertices	2026101
Edges	0

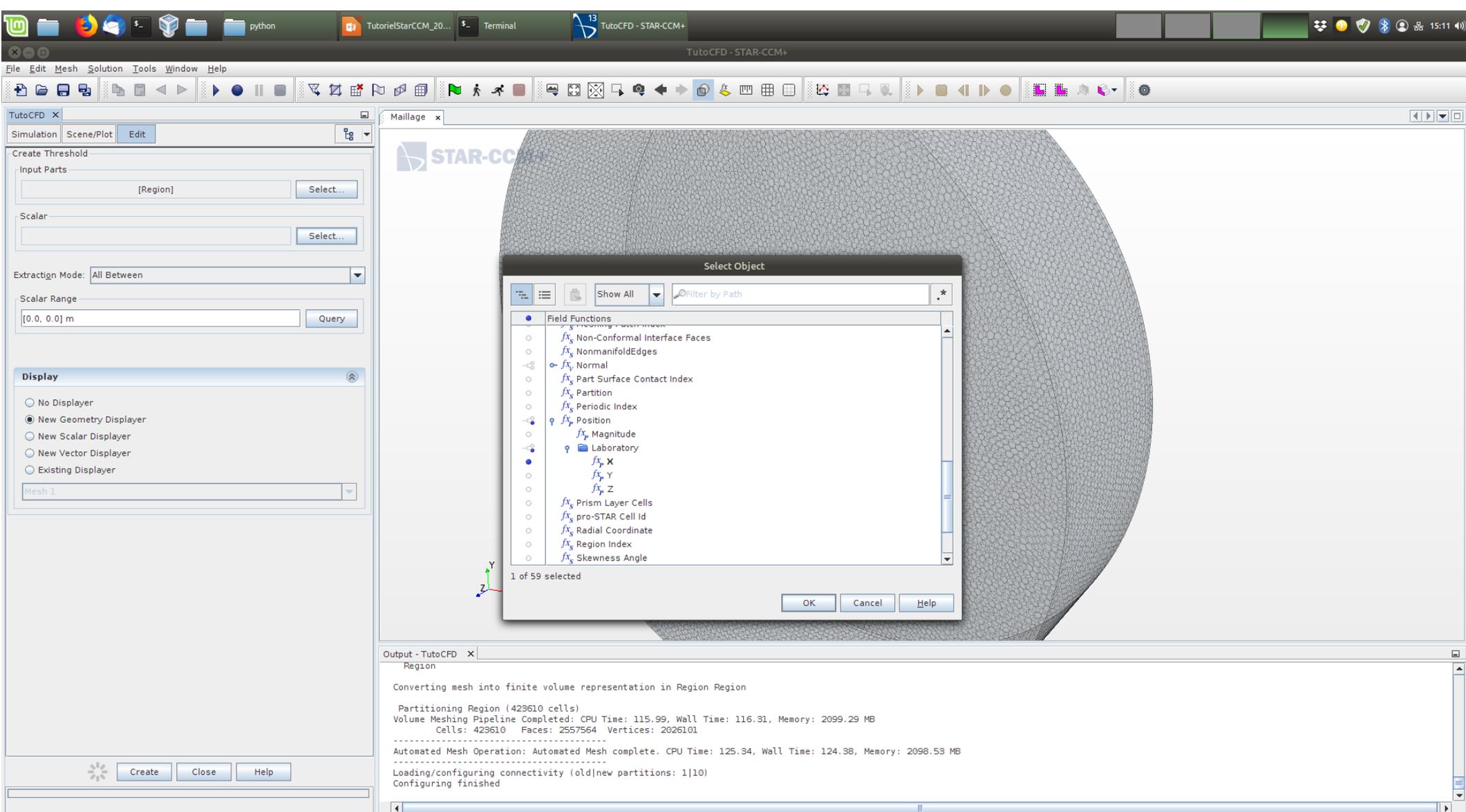
The bottom-right panel, titled 'Output - TutoCFD', contains the following text:

```
Region
Converting mesh into finite volume representation in Region Region
Partitioning Region (423610 cells)
Volume Meshing Pipeline Completed: CPU Time: 115.99, Wall Time: 116.31, Memory: 2099.29 MB
Cells: 423610 Faces: 2557564 Vertices: 2026101
-----
Automated Mesh Operation: Automated Mesh complete. CPU Time: 125.34, Wall Time: 124.38, Memory: 2098.53 MB
-----
Loading/configuring connectivity (old|new partitions: 1|10)
Configuring finished
```

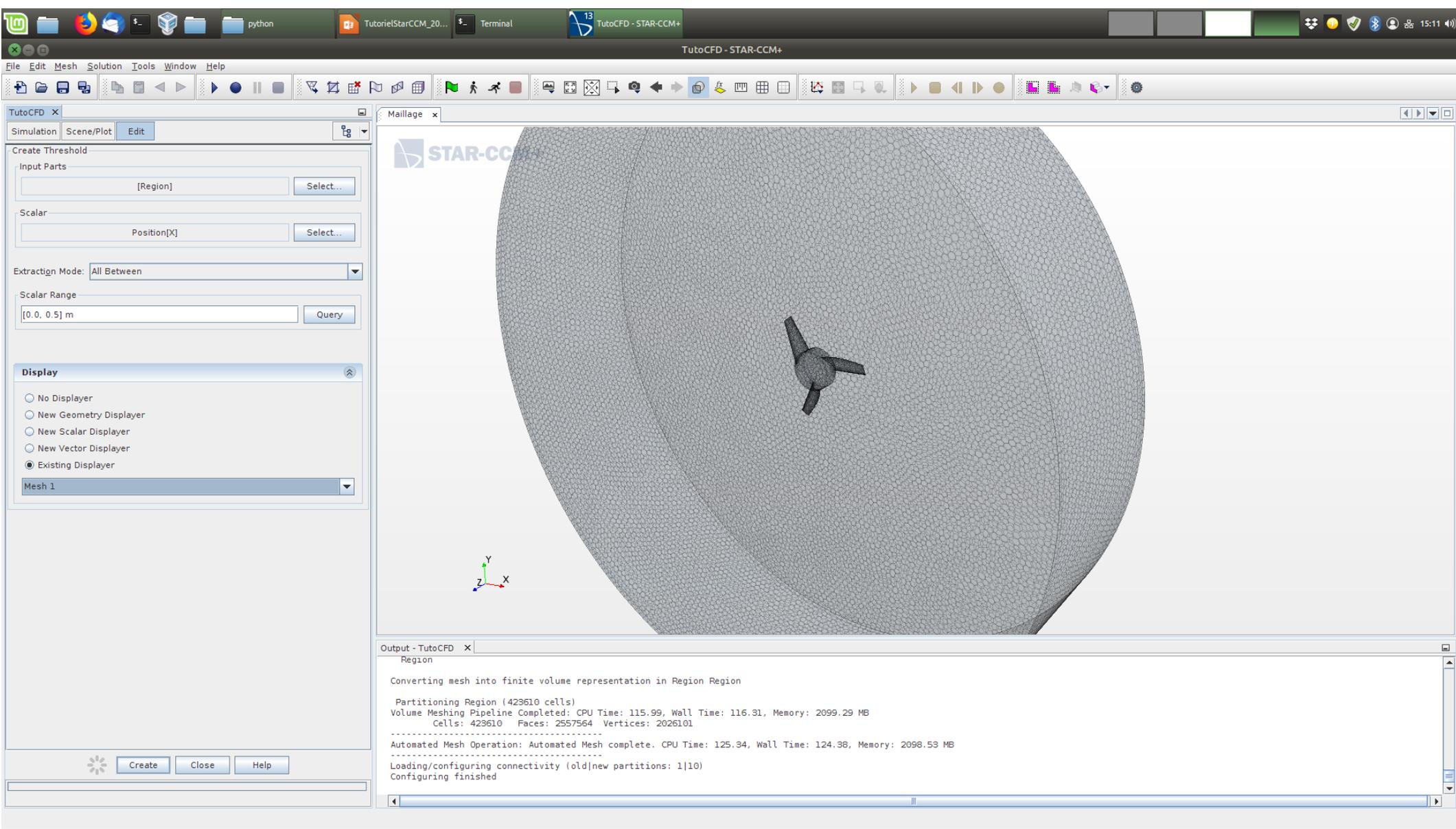
Relever le nombre de cellules du maillage.



On va créer une “Derived Part” pour la visualisation du maillage.  
Choisir le type “Threshold”...

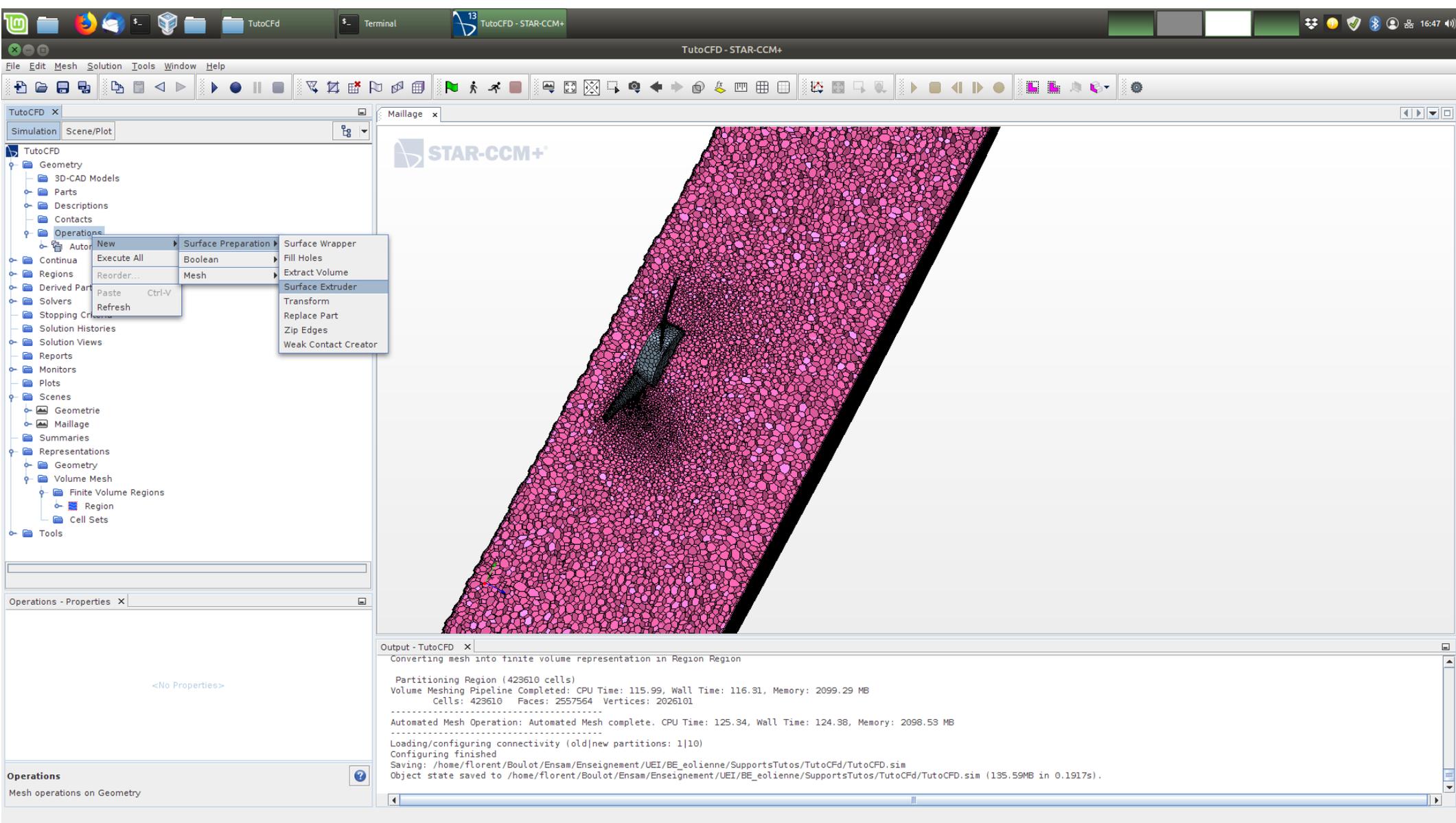


Spécifier l' "Input Parts", puis le champ scalaire (ici la position X), et enfin la valeur du seuil (ici entre X=0 et X=0.5m).

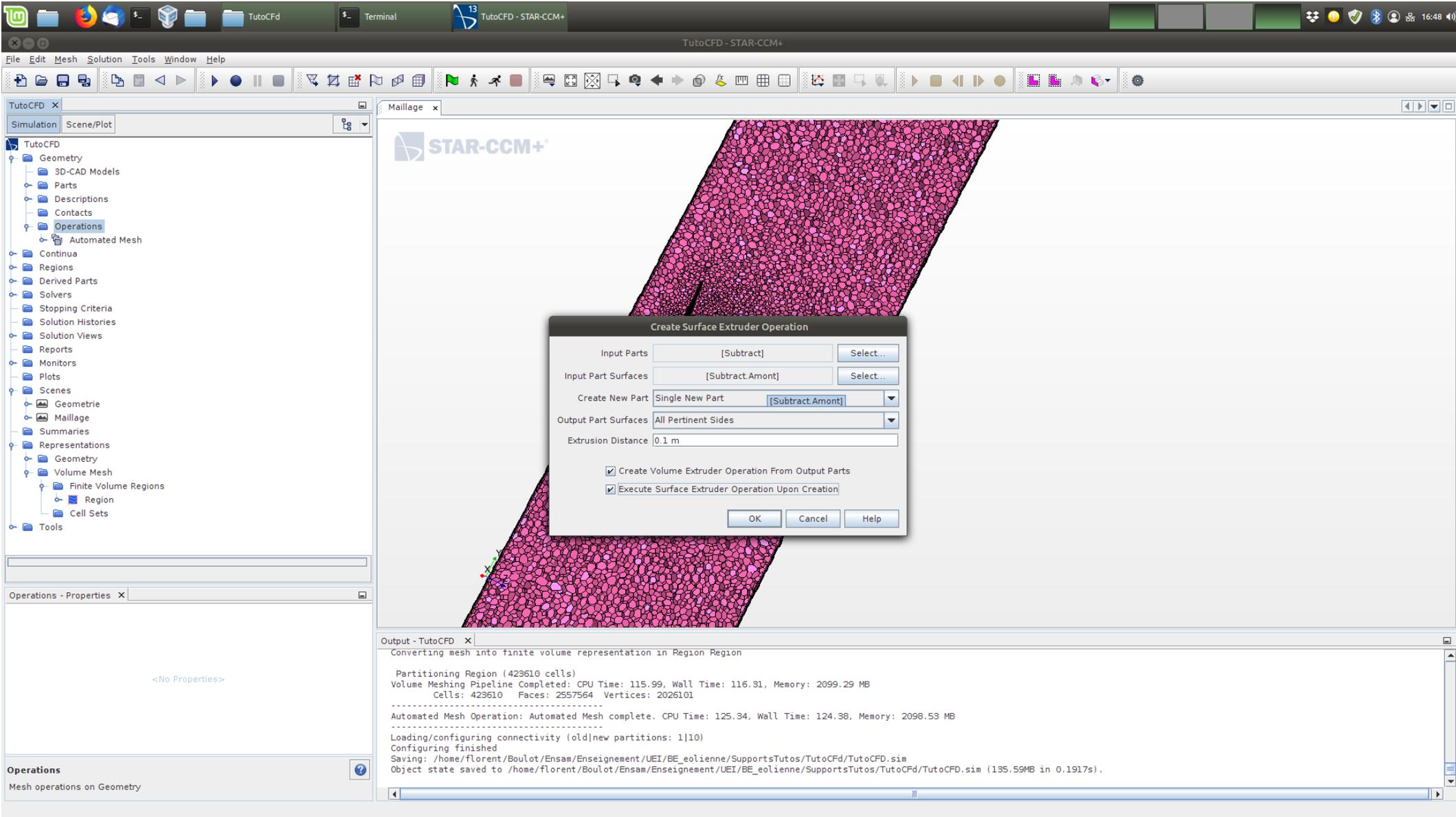


Changer dans "Display" pour l'"Existing Displayer" "Mesh1".  
Cliquer sur Create et quitter l'atelier...





On va créer un volume d'extrusion en entrée.  
Cliquer sur "Operations", "New", "Surface Preparation", "Surface Extruder".



Choisir la "Input Parts", puis la surface à partir de laquelle on extrude, et la distance d'extrusion. Cliquer sur les options "Create Volume..." et "Execute Surface Extruder ...".

The screenshot displays the STAR-CCM+ software interface. The main window shows a 3D model of a curved blade-like geometry with a pink mesh. The left sidebar contains a tree view with the following structure:

- TutoCFD
  - Geometry
    - 3D-CAD Models
    - Parts
    - Descriptions
    - Contacts
    - Operations
      - Automated Mesh
      - Surface Extruder
      - Volume Extruder
        - Controls
          - Number of Layers (selected)
          - Stretching Function
  - Continua
  - Regions
  - Derived Parts
  - Solvers
  - Stopping Criteria
  - Solution Histories
  - Solution Views
  - Reports
  - Monitors
  - Plots
  - Scenes
    - Geometrie
    - Maillage
  - Summaries
  - Representations
    - Geometry
    - Volume Mesh
    - Finite Volume Regions

The 'Number of Layers - Properties' panel is open, showing:

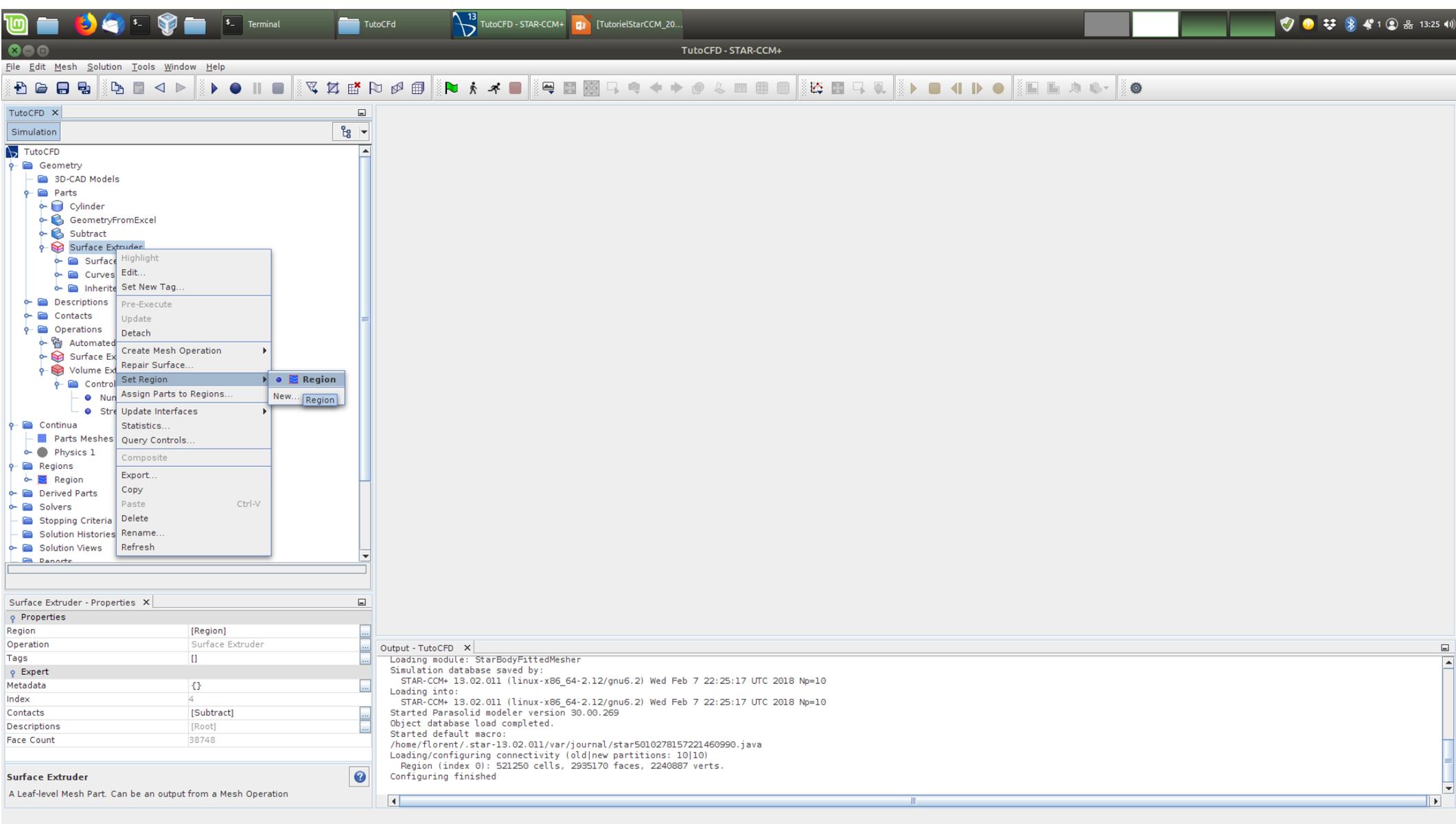
Properties	
Number of Layers	10

The 'Output - TutoCFD' window shows the following log:

```
Partitioning Region (423610 cells)
Volume Meshing Pipeline Completed: CPU Time: 115.99, Wall Time: 116.31, Memory: 2099.29 MB
Cells: 423610 Faces: 2557564 Vertices: 2026101
-----
Automated Mesh Operation: Automated Mesh complete. CPU Time: 125.34, Wall Time: 124.38, Memory: 2098.53 MB
-----
Loading/configuring connectivity (old|new partitions: 1|10)
Configuring finished
Saving: /home/florent/Boulot/Ensam/Enseignement/UEI/BE_eolienne/SupportsTutos/TutoCFd/TutoCFD.sim
Object state saved to /home/florent/Boulot/Ensam/Enseignement/UEI/BE_eolienne/SupportsTutos/TutoCFd/TutoCFD.sim (135.59MB in 0.1917s).
Done executing Surface Extruder Operation : Surface Extruder
```

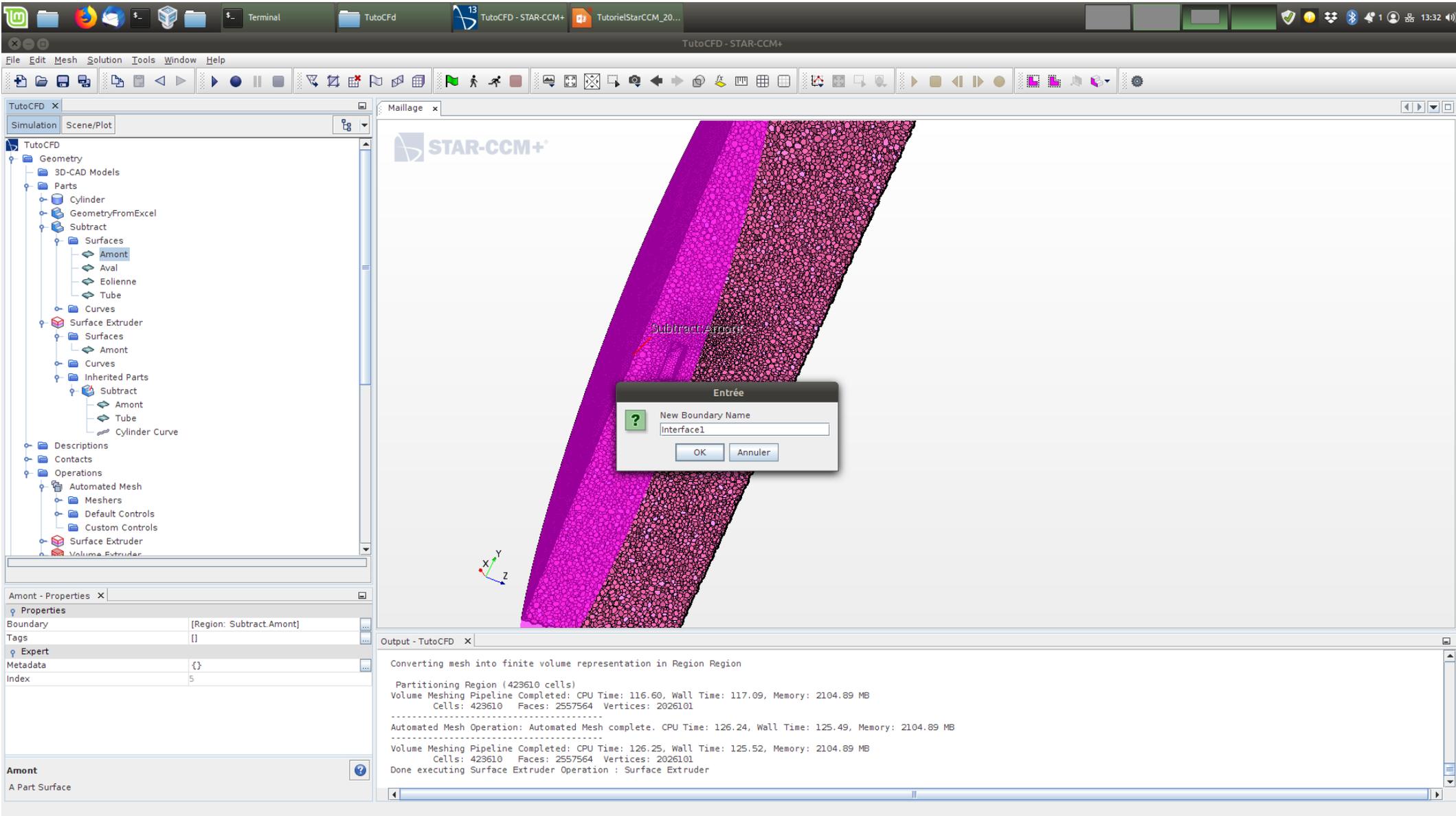
At the bottom, the 'Number of Layers' help text reads: "Specifies Number of Layers in the volume mesh for a given part. Range: [1 .. ∞)".

Paramétrer le nombre de couches extrudées.



On doit affecter la “Part” ainsi créée à une “Region” existante.



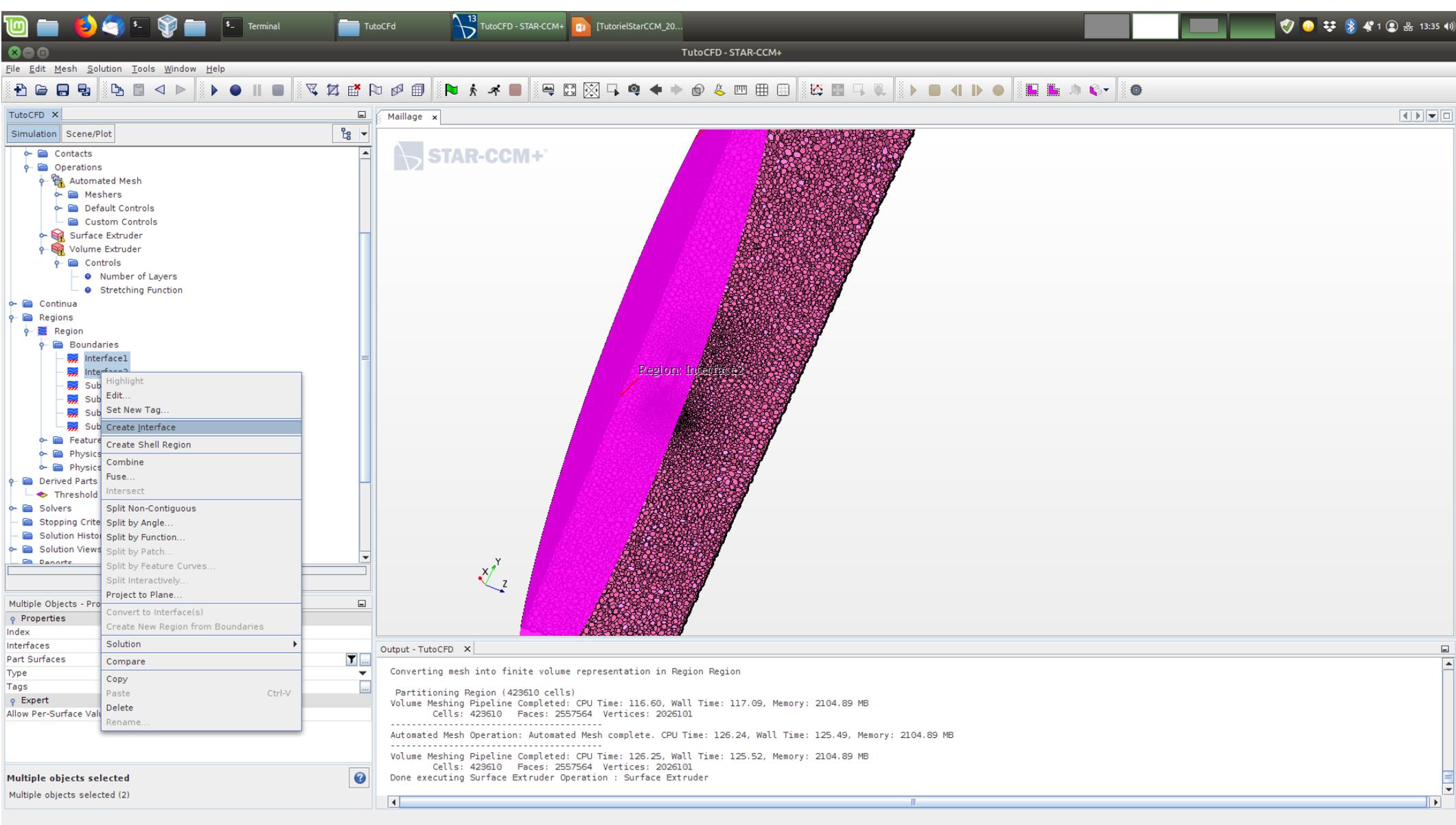


L'appeler "Interface1" puis OK.

The screenshot displays the STAR-CCM+ software interface. The main window shows a 3D model of a curved, tapered object with a fine mesh. A context menu is open over the 'Amont' surface, with 'Set Boundary' selected. The 'Set Boundary' submenu is also open, showing 'Interface1' and 'Subtract.Amont' as options. The 'Subtract.Amont' option is selected. The 'Properties' panel for 'Subtract.Amont' is visible, showing 'Boundary' set to '[Region: Subtract.Amont]'. The 'Output' window at the bottom shows the following text:

```
Converting mesh into finite volume representation in Region Region
Partitioning Region (423610 cells)
Volume Meshing Pipeline Completed: CPU Time: 116.60, Wall Time: 117.09, Memory: 2104.89 MB
Cells: 423610 Faces: 2557564 Vertices: 2026101
-----
Automated Mesh Operation: Automated Mesh complete. CPU Time: 126.24, Wall Time: 125.49, Memory: 2104.89 MB
-----
Volume Meshing Pipeline Completed: CPU Time: 126.25, Wall Time: 125.52, Memory: 2104.89 MB
Cells: 423610 Faces: 2557564 Vertices: 2026101
Done executing Surface Extruder Operation : Surface Extruder
```

On recommence pour la même surface côté volume d'extrusion. Sélectionner la bonne surface, "Set Boundary", "New", puis l'appeler "Interface2"...



Enfin, dans le menu “Regions”, sélectionner les deux frontières, puis clic-droit et “Create Interface”.

The screenshot shows the STAR-CCM+ software interface. The main window displays a 3D model of a curved surface with a pink mesh. The left sidebar shows the 'Surface Extruder' operation selected. The bottom panel shows the 'Output - TutoCFD' window with a log of meshing operations.

**Surface Extruder - Properties**

Property	Value
Region	[Region]
Operation	Surface Extruder
Tags	{}
Expert	
Metadata	{}
Index	5
Contacts	[Subtract]
Descriptions	[Root]
Face Count	38748

**Output - TutoCFD**

```
Converting mesh into finite volume representation in Region Region
Partitioning Region (423610 cells)
Volume Meshing Pipeline Completed: CPU Time: 116.60, Wall Time: 117.09, Memory: 2104.89 MB
Cells: 423610 Faces: 2557564 Vertices: 2026101
-----
Automated Mesh Operation: Automated Mesh complete. CPU Time: 126.24, Wall Time: 125.49, Memory: 2104.89 MB
-----
Volume Meshing Pipeline Completed: CPU Time: 126.25, Wall Time: 125.52, Memory: 2104.89 MB
Cells: 423610 Faces: 2557564 Vertices: 2026101
Done executing Surface Extruder Operation : Surface Extruder
```

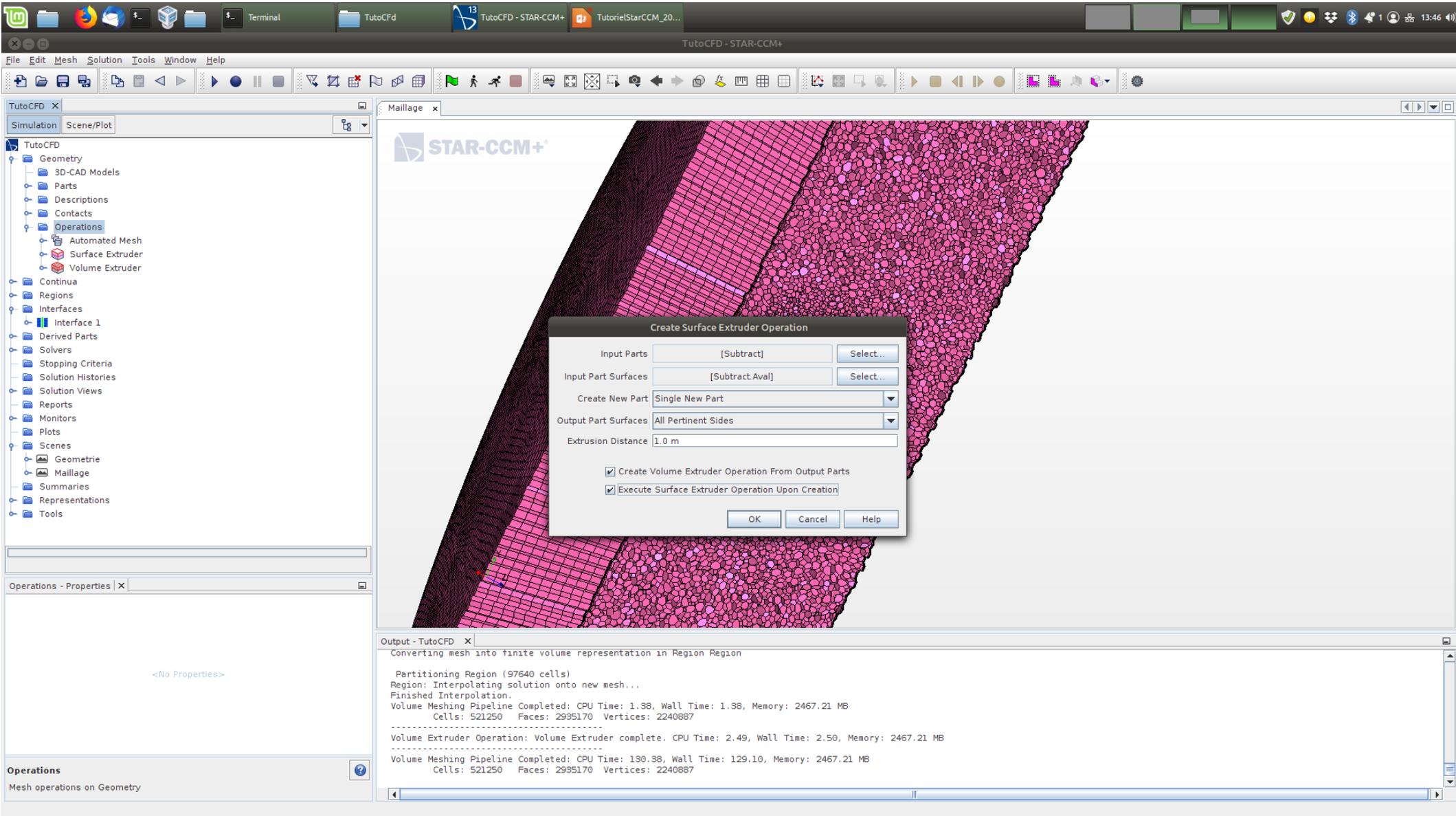
On re-génère le maillage...

The image shows the STAR-CCM+ software interface. The main window displays a 3D model of a curved, tapered object with a central hole, fully meshed in pink. The mesh is composed of numerous small, irregular cells. The interface includes a top menu bar (File, Edit, Mesh, Solution, Tools, Window, Help), a toolbar with various icons, and a left-hand tree view showing the project hierarchy. The tree view includes folders for Geometry, Continua, Regions, Boundaries, Feature Curves, Physics Conditions, Physics Values, Interfaces, Derived Parts, Solvers, Stopping Criteria, Solution Histories, Solution Views, Reports, Monitors, Plots, Scenes, and Maillage. The 'Regions' folder is expanded, showing a list of boundaries and interfaces. Below the tree view is the 'Regions - Properties' panel, which shows the 'Part Selection Priority' and 'Regions' list. The 'Output - TutoCFD' panel at the bottom right displays the following text:

```
Output - TutoCFD X
Converting mesh into finite volume representation in Region Region

Partitioning Region (97640 cells)
Region: Interpolating solution onto new mesh...
Finished Interpolation.
Volume Meshing Pipeline Completed: CPU Time: 1.38, Wall Time: 1.38, Memory: 2467.21 MB
Cells: 521250 Faces: 2935170 Vertices: 2240887
-----
Volume Extruder Operation: Volume Extruder complete. CPU Time: 2.49, Wall Time: 2.50, Memory: 2467.21 MB
-----
Volume Meshing Pipeline Completed: CPU Time: 130.38, Wall Time: 129.10, Memory: 2467.21 MB
Cells: 521250 Faces: 2935170 Vertices: 2240887
```

On obtient finalement ceci.



On recommence avec un volume aval.

Cette fois-ci, on prendra une distance d'extrusion de l'ordre de 5 à 10 fois le diamètre de l'éolienne...

The image shows the STAR-CCM+ software interface. The main window displays a 3D mesh of a curved surface, colored in shades of pink and purple. The mesh is composed of numerous small, irregular cells. The interface includes a top menu bar with options like File, Edit, Mesh, Solution, Tools, Window, and Help. Below the menu bar is a toolbar with various icons for meshing and simulation. On the left side, there is a tree view showing the project hierarchy, including folders for Geometry, Operations, and Solvers. The 'Stretching Function' property is highlighted in the tree view. At the bottom of the interface, there is an 'Output - TutoCFD' window displaying the following text:

```
Partitioning Region (97640 cells)
Region: Interpolating solution onto new mesh...
Finished Interpolation.
Volume Meshing Pipeline Completed: CPU Time: 1.38, Wall Time: 1.38, Memory: 2467.21 MB
Cells: 521250 Faces: 2935170 Vertices: 2240887
-----
Volume Extruder Operation: Volume Extruder complete. CPU Time: 2.49, Wall Time: 2.50, Memory: 2467.21 MB
-----
Volume Meshing Pipeline Completed: CPU Time: 130.38, Wall Time: 129.10, Memory: 2467.21 MB
Cells: 521250 Faces: 2935170 Vertices: 2240887
Attempting to orient non-manifold surface
Done executing Surface Extruder Operation : Surface Extruder 2
```

L'extrusion peut être rendue progressive, avec une "Stretching Function" (choisir le "One Sided Geometric")...



TutoCFD - STAR-CCM+

File Edit Mesh Solution Tools Window Help

TutoCFD x Maillage x

STAR-CCM+

TutoCFD

- Geometry
- Continua
- Regions
- Interfaces
  - Interface 1
  - Interface 2
- Derived Parts
- Solvers
- Stopping Criteria
- Solution Histories
- Solution Views
- Reports
- Monitors
- Plots
- Scenes
  - Geometry
  - Maillage
- Summaries
- Representations
  - Geometry
  - Volume Mesh
    - Finite Volume Regions
      - Region
    - Cell Sets
- Tools

Region - Properties x

Properties

Cells	1020900
Interior Faces	4907827
Vertices	3260071
Edges	0

Region

A region discretization

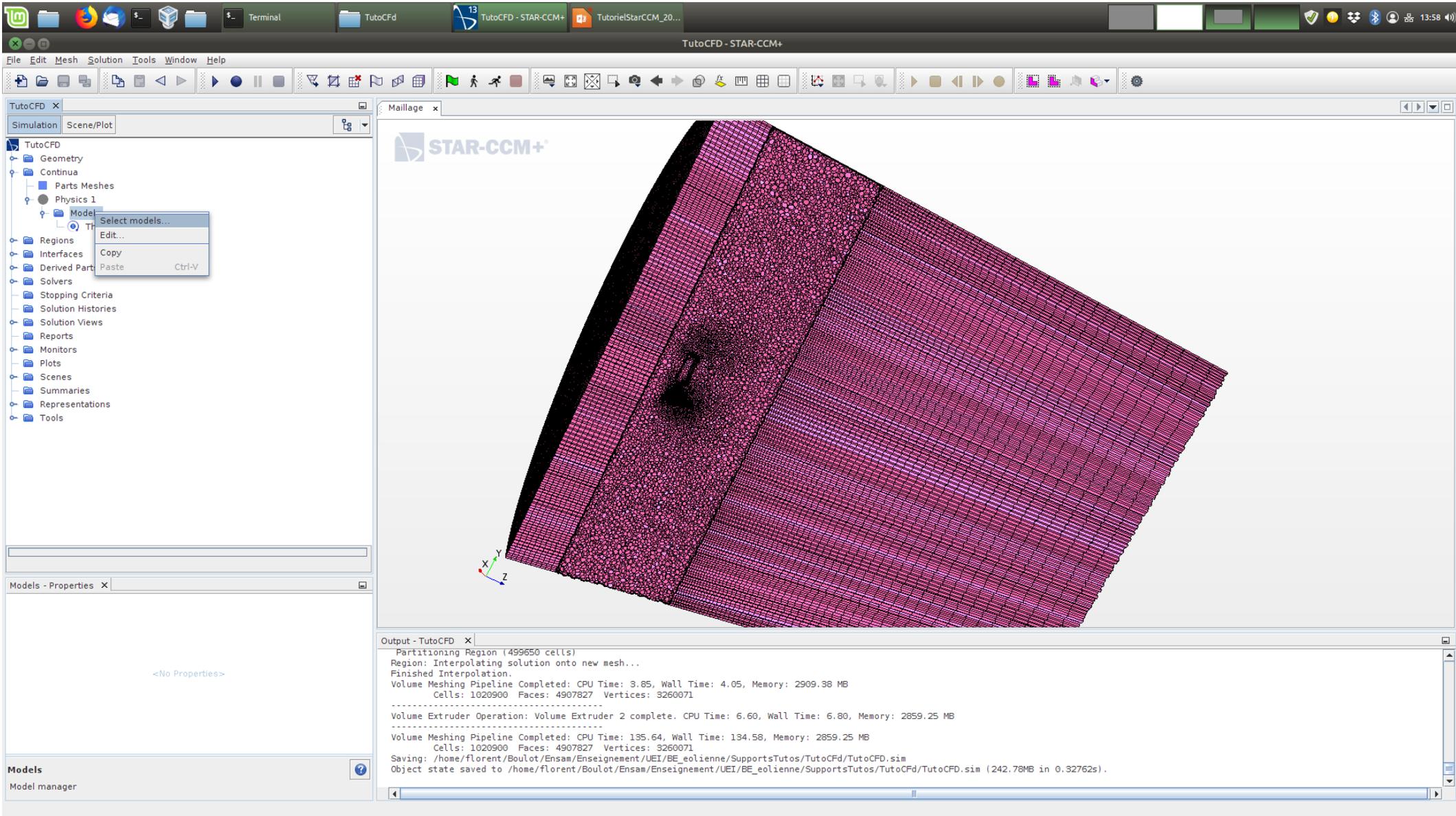
Output - TutoCFD x

```
Converting mesh into finite volume representation in Region Region
Partitioning Region (499650 cells)
Region: Interpolating solution onto new mesh...
Finished Interpolation.
Volume Meshing Pipeline Completed: CPU Time: 3.85, Wall Time: 4.05, Memory: 2909.38 MB
Cells: 1020900 Faces: 4907827 Vertices: 3260071
.....
Volume Extruder Operation: Volume Extruder 2 complete. CPU Time: 6.60, Wall Time: 6.80, Memory: 2859.25 MB
.....
Volume Meshing Pipeline Completed: CPU Time: 135.64, Wall Time: 134.58, Memory: 2859.25 MB
Cells: 1020900 Faces: 4907827 Vertices: 3260071
```

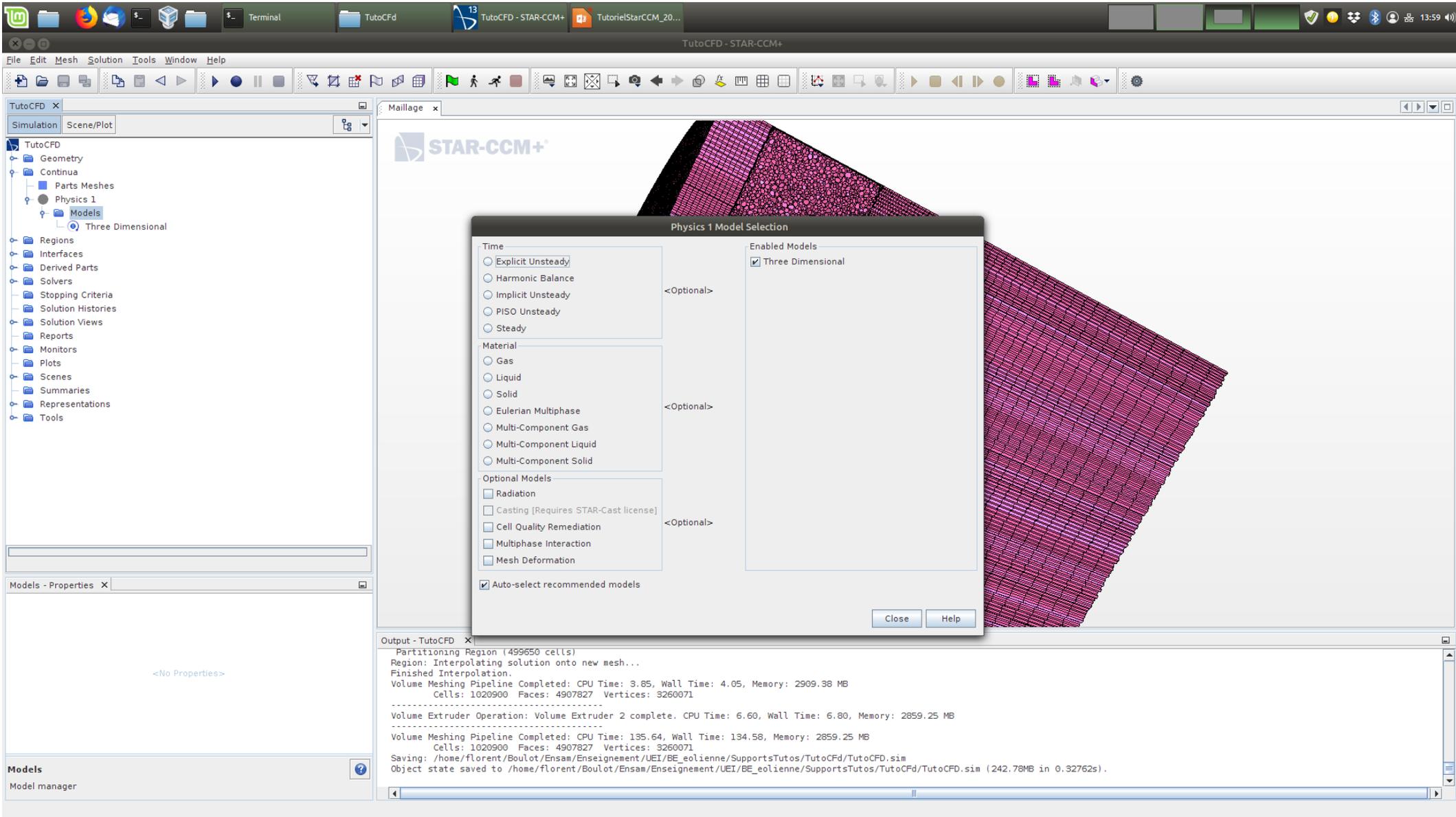
Résultat final, noter le nombre de cellules du maillage.

# Modèles

- Choix des équations à résoudre
- Propriétés du fluide
- Résolution en référentiel tournant
- Paramétrage des conditions aux limites



Choix des modèles...



Choisir "Steady", "Gas", "Segregated Flow", "Constant Density", "Turbulent", "k-epsilon Turbulence"...

The screenshot displays the ANSYS Fluent software interface. A central dialog box titled "Physics 1 Model Selection" is open, showing a list of models categorized into "Optional Models" and "Enabled Models".

**Optional Models:**

- Segregated Fluid Enthalpy
- Co-Simulation
- Electromagnetism
- Passive Scalar
- Conservative Interpolation
- Turbulence Suppression
- Fluid Film
- Mesh Deformation
- Dispersed Multiphase
- Multiphase Interaction
- Virtual Disk
- Porous Media
- Gravity
- Turbulent Viscosity User Scaling
- Radiation
- Cell Quality Remediation
- Lagrangian Multiphase
- Aeroacoustics
- Boussinesq Model
- Segregated Fluid Isothermal
- Vorticity Confinement Model
- Electrochemistry
- Plasma
- Segregated Fluid Temperature

**Enabled Models:**

- Two-Layer All y+ Wall Treatment
- Exact Wall Distance
- Realizable K-Epsilon Two-Layer
- K-Epsilon Turbulence
- Reynolds-Averaged Navier-Stokes
- Turbulent
- Constant Density
- Gradients
- Segregated Flow
- Gas
- Steady
- Three Dimensional

At the bottom of the dialog, there is a checkbox for "Auto-select recommended models" which is checked. "Close" and "Help" buttons are located at the bottom right of the dialog.

The background shows the software's main interface with a meshed geometry on the right and a tree view on the left. The tree view includes "Physics 1" and "Models" under "Physics 1". The "Output - TutoCFD" window at the bottom displays the following text:

```
Volume Meshing Pipeline Completed: CPU Time: 3.85, Wall Time: 4.05, Memory: 2909.38 MB
Cells: 1020900 Faces: 4907827 Vertices: 3260071
-----
Volume Extruder Operation: Volume Extruder 2 complete. CPU Time: 6.60, Wall Time: 6.80, Memory: 2859.25 MB
-----
Volume Meshing Pipeline Completed: CPU Time: 135.64, Wall Time: 134.58, Memory: 2859.25 MB
Cells: 1020900 Faces: 4907827 Vertices: 3260071
Saving: /home/florent/Boulot/Ensam/Enseignement/UEI/BE_eolienne/SupportsTutos/TutoCFd/TutoCFD.sim
Object state saved to /home/florent/Boulot/Ensam/Enseignement/UEI/BE_eolienne/SupportsTutos/TutoCFd/Boulot/Ensam/SupportsTutos/TutoCFd/TutoCFD.sim (242.78MB in 0.32762s).
Reading material property database "/opt/CD-adapco/13.02.011/STAR-CCM+13.02.011/star/props.mdb"...
Loading module: SegregatedFlowModel
Loading module: KeTurbModel
```

Résultat final.

The image shows the STAR-CCM+ software interface. The main window displays a 3D mesh of a volume extruder, colored in a reddish-pink hue. The mesh is composed of numerous small, interconnected elements. The interface includes a top menu bar with options like File, Edit, Mesh, Solution, Tools, Window, and Help. Below the menu is a toolbar with various icons for simulation control. On the left side, there is a tree view showing the simulation setup, including Geometry, Continua, Parts Meshes, Physics 1, Models, Reference Values, Regions, Interfaces, Derived Parts, and Solvers. The 'Models' section is expanded, showing 'Air' with 'Material Properties' set to 'Constant'. The 'Constant - Properties' window is open, showing the 'Density' property set to '1.2 kg/m^3'. The 'Output - TutoCFD' window at the bottom displays the following text:

```
-----
Volume Extruder Operation: Volume Extruder 2 complete. CPU Time: 6.60, Wall Time: 6.80, Memory: 2859.25 MB
Volume Meshing Pipeline Completed: CPU Time: 135.64, Wall Time: 134.58, Memory: 2859.25 MB
Cells: 1020900 Faces: 4907827 Vertices: 3260071
Saving: /home/florent/Boulot/Ensam/Enseignement/UEI/BE_eolienne/SupportsTutos/TutoCfd/TutoCFD.sim
Object state saved to /home/florent/Boulot/Ensam/Enseignement/UEI/BE_eolienne/SupportsTutos/TutoCfd/TutoCFD.sim (242.78MB in 0.32762s).
Reading material property database "/opt/CD-adapco/13.02.011/STAR-CCM+13.02.011/star/props.mdb"...
Loading module: SegregatedFlowModel
Loading module: KeTurbModel
Saving: /home/florent/Boulot/Ensam/Enseignement/UEI/BE_eolienne/SupportsTutos/TutoCfd/TutoCFD.sim
Object state saved to /home/florent/Boulot/Ensam/Enseignement/UEI/BE_eolienne/SupportsTutos/TutoCFD.sim (242.98MB in 0.30374s).
```

On peut modifier la densité du fluide (on en aura besoin pour le post-traitement).

The image shows the STAR-CCM+ software interface. The main window displays a 3D mesh of a curved extruder part, with a central region labeled "Region: Substract.Amont". The left sidebar contains a tree view of the simulation setup, including Geometry, Continuum, Parts Meshes, Physics 1, and Regions. The "Substract.Amont" region is selected, and its properties are shown in the bottom-left panel. The "Type" dropdown menu is open, showing options like "Mass Flow Inlet", "Outlet", "Overset Mesh", "Pressure Outlet", "Stagnation Inlet", "Symmetry Plane", "Velocity inlet", and "Wall". The "Output - TutoCFD" window at the bottom right displays simulation logs, including volume extruder and meshing pipeline completion times and memory usage.

STAR-CCM+

Region: Substract.Amont

Substract.Amont - Properties

Index	13
Interfaces	
Part Surfaces	[Surface Extruder.Amont]
Type	Wall
Tags	Mass Flow Inlet Outlet
Expert	Overset Mesh Pressure Outlet Stagnation Inlet Symmetry Plane
Allow Per-Surface Values	Velocity inlet Wall
Type	Boundary type

Output - TutoCFD

```
-----  
Volume Extruder Operation: Volume Extruder 2 complete. CPU Time: 6.60, Wall Time: 6.80, Memory: 2859.25 MB  
-----  
Volume Meshing Pipeline Completed: CPU Time: 135.64, Wall Time: 134.58, Memory: 2859.25 MB  
Cells: 1020900 Faces: 4907827 Vertices: 3260071  
Saving: /home/florent/Boulot/Ensam/Enseignement/UEI/BE_eolienne/SupportsTutos/TutoCfd/TutoCFD.sim  
Object state saved to /home/florent/Boulot/Ensam/Enseignement/UEI/BE_eolienne/SupportsTutos/TutoCfd/TutoCFD.sim (242.78MB in 0.32762s).  
Reading material property database "/opt/CD-adapco/13.02.011/STAR-CCM+13.02.011/star/props.mdb"...  
Loading module: SegregatedFlowModel  
Loading module: KeTurbModel  
Saving: /home/florent/Boulot/Ensam/Enseignement/UEI/BE_eolienne/SupportsTutos/TutoCfd/TutoCFD.sim  
Object state saved to /home/florent/Boulot/Ensam/Enseignement/UEI/BE_eolienne/SupportsTutos/TutoCfd/TutoCFD.sim (242.98MB in 0.30374s).
```

Modifier le type de conditions aux limites: "Velocity inlet" en amont...

TutoCFD - STAR-CCM+

File Edit Mesh Solution Tools Window Help

TutoCFD x Maillage x

Simulation Scene/Plot

TutoCFD

- Geometry
- Continua
- Parts Meshes
- Physics 1
- Regions
  - Region
    - Boundaries
      - Interface1
        - Interface1 [Interface 1]
        - Interface2
        - Interface2 [Interface 1]
        - Interface3
        - Interface3 [Interface 2]
        - Interface4
        - Interface4 [Interface 2]
        - Subtract.Amont
        - Subtract.Aval
        - Subtract.Eolienne
        - Subtract.Tube
      - Feature Curves
      - Physics Conditions
      - Physics Values
    - Interfaces
    - Derived Parts
    - Solvers
    - Stopping Criteria
    - Solution Histories
    - Solution Views
    - Reports

Subtract.Aval - Properties x

Properties

Index	14
Interfaces	
Part Surfaces	[Surface Extruder 2.Aval]
Type	Pressure Outlet
Tags	[]

Expert

Allow Per-Surface Values

Type

Boundary type

STAR-CCM+

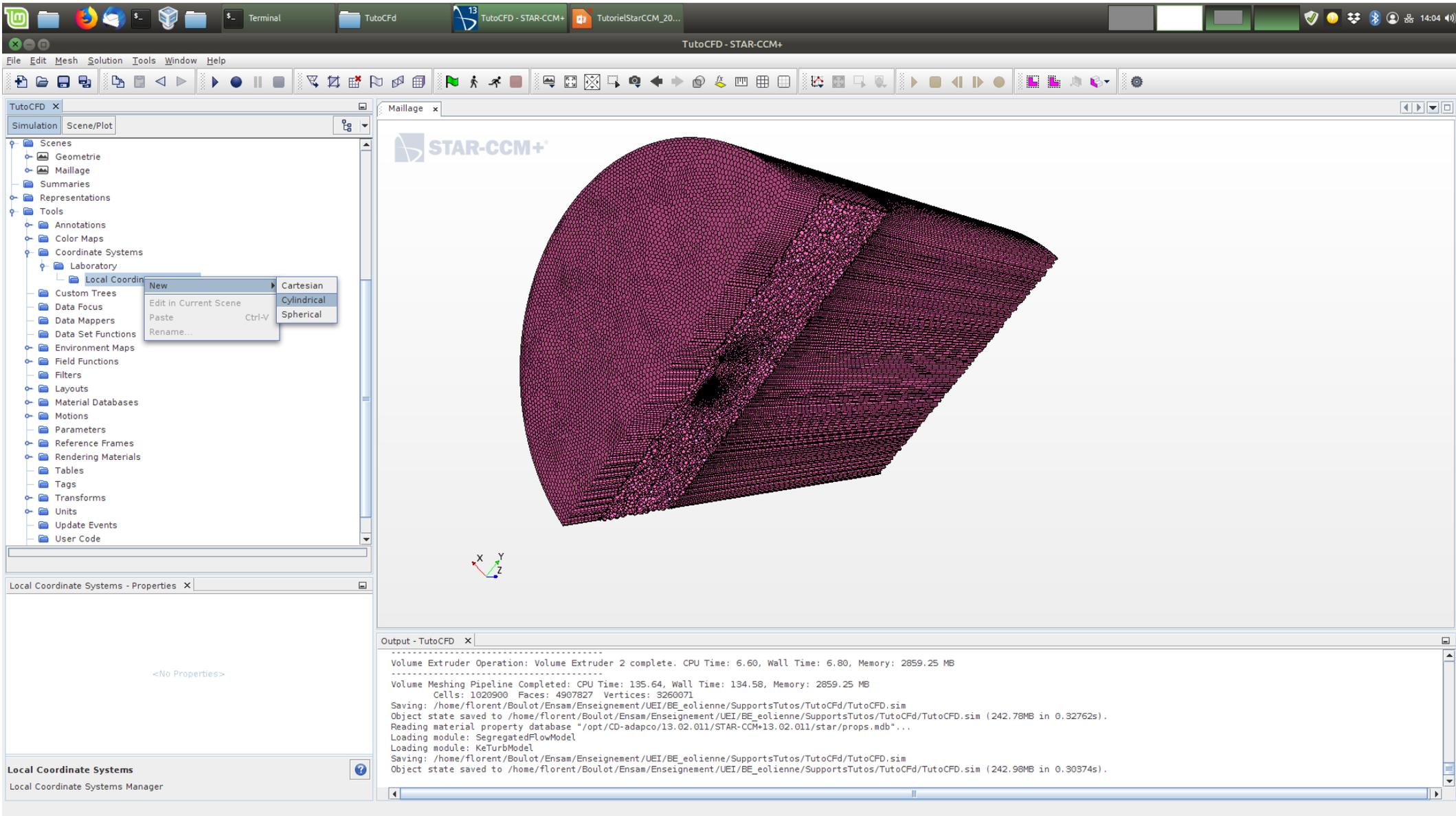
Region: Subtract.Aval

Output - TutoCFD x

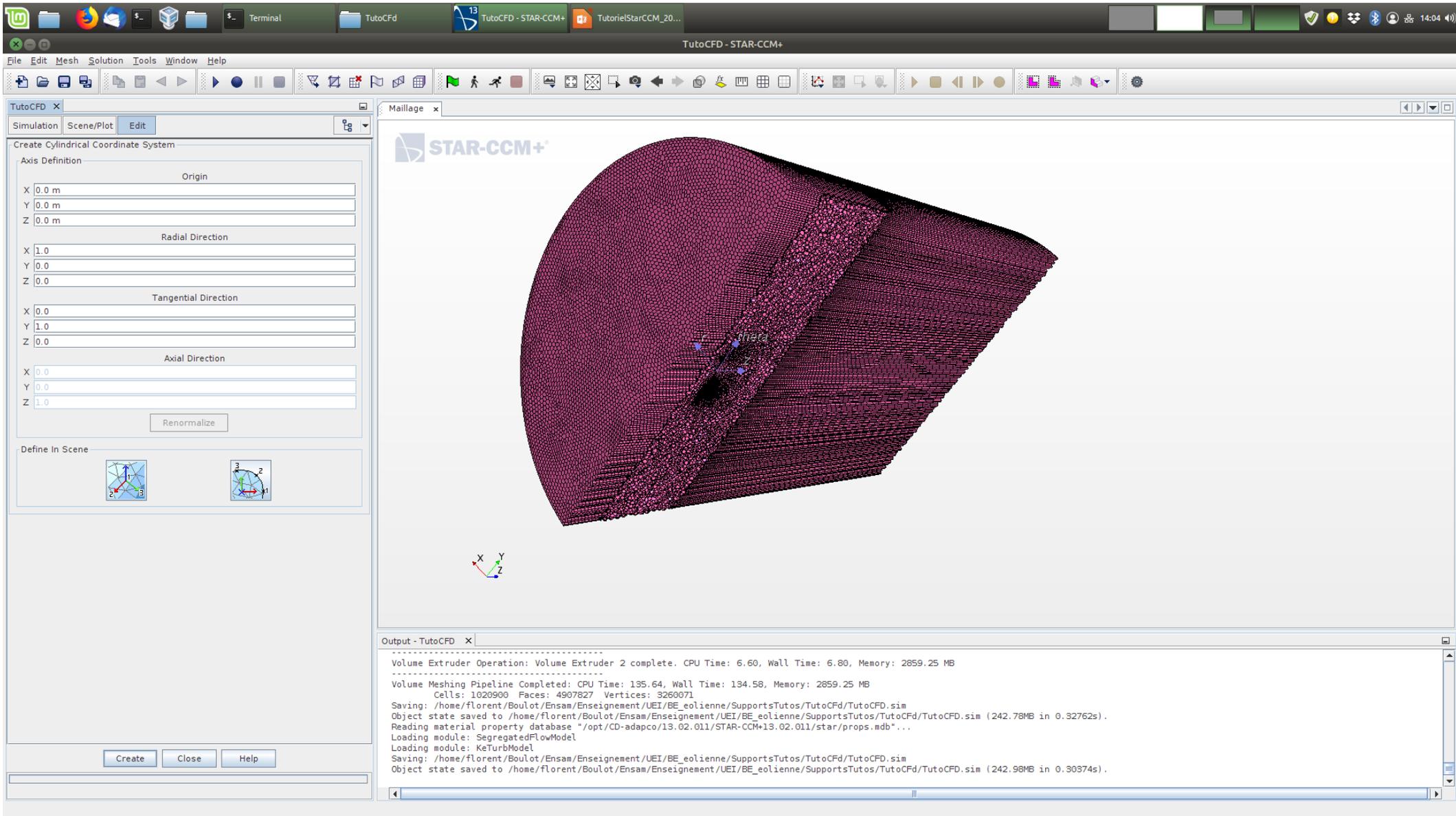
```
Volume Extruder Operation: Volume Extruder 2 complete. CPU Time: 6.60, Wall Time: 6.80, Memory: 2859.25 MB
Volume Meshing Pipeline Completed: CPU Time: 135.64, Wall Time: 134.58, Memory: 2859.25 MB
Cells: 1020900 Faces: 4907827 Vertices: 3260071
Saving: /home/florent/Boulot/Ensam/Enseignement/UEI/BE_eolienne/SupportsTutos/TutoCfd/TutoCFD.sim
Object state saved to /home/florent/Boulot/Ensam/Enseignement/UEI/BE_eolienne/SupportsTutos/TutoCfd/TutoCFD.sim (242.78MB in 0.32762s).
Reading material property database "/opt/CD-adapco/13.02.011/STAR-CCM+13.02.011/star/props.mdb"...
Loading module: SegregatedFlowModel
Loading module: KeTurbModel
Saving: /home/florent/Boulot/Ensam/Enseignement/UEI/BE_eolienne/SupportsTutos/TutoCfd/TutoCFD.sim
Object state saved to /home/florent/Boulot/Ensam/Enseignement/UEI/BE_eolienne/SupportsTutos/TutoCfd/TutoCFD.sim (242.98MB in 0.30374s).
```

“Pressure Outlet” en aval.

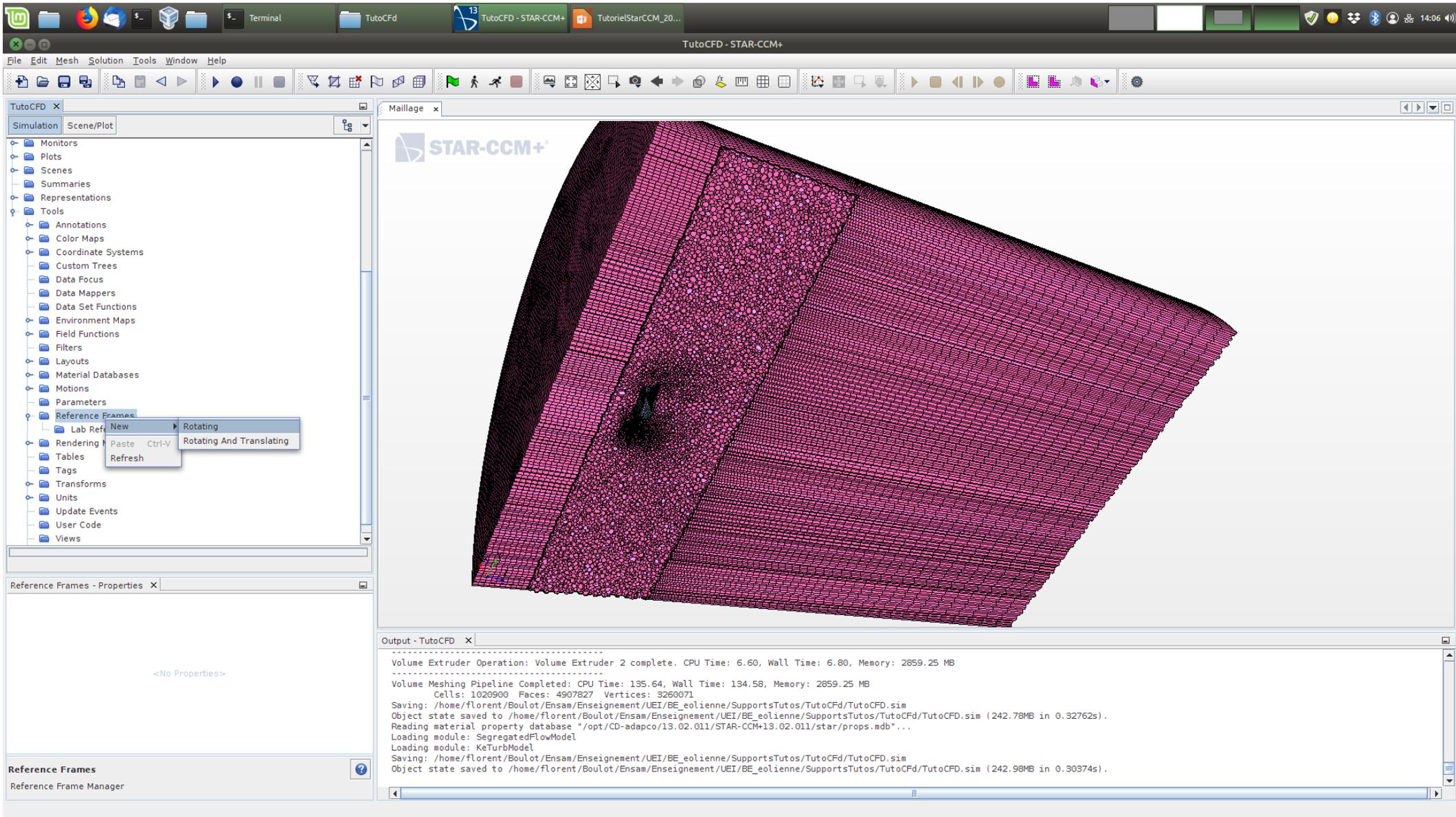




On va créer un système de coordonnées cylindriques à toutes fins utiles.



Prendre la “bonne” orientation.



On va créer un nouveau "Reference Frame"...

TutoCFD - STAR-CCM+

File Edit Mesh Solution Tools Window Help

TutoCFD x Maillage x

STAR-CCM+

Simulation Scene/Plot

- Monitors
- Plots
- Scenes
- Summaries
- Representations
- Tools
  - Annotations
  - Color Maps
  - Coordinate Systems
  - Custom Trees
  - Data Focus
  - Data Mappers
  - Data Set Functions
  - Environment Maps
  - Field Functions
  - Filters
  - Layouts
  - Material Databases
  - Motions
  - Parameters
  - Reference Frames
    - Lab Reference Frame
    - Rotating**
      - Relative Reference Frames
  - Rendering Materials
  - Tables
  - Tags
  - Transforms
  - Units
  - Update Events

Rotating - Properties x

Properties

Axis Direction	[0.0, 0.0, 1.0]
Axis Origin	[0.0, 0.0, 0.0] m
Rotation Rate	-3231.4 rpm
Coordinate System	Laboratory
Tags	[-3231.4 rpm]

Rotation Rate

Rotation rate

Output - TutoCFD x

```
-----
Volume Extruder Operation: Volume Extruder 2 complete. CPU Time: 6.60, Wall Time: 6.80, Memory: 2859.25 MB
-----
Volume Meshing Pipeline Completed: CPU Time: 135.64, Wall Time: 134.58, Memory: 2859.25 MB
Cells: 1020900 Faces: 4907827 Vertices: 3260071
Saving: /home/florent/Boulot/Ensam/Enseignement/UEI/BE_eolienne/SupportsTutos/TutoCFd/TutoCFD.sim
Object state saved to /home/florent/Boulot/Ensam/Enseignement/UEI/BE_eolienne/SupportsTutos/TutoCFd/TutoCFD.sim (242.78MB in 0.32762s).
Reading material property database "/opt/CD-adapco/13.02.011/STAR-CCM+13.02.011/star/props.mdb"...
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Object state saved to /home/florent/Boulot/Ensam/Enseignement/UEI/BE_eolienne/SupportsTutos/TutoCFd/TutoCFD.sim (242.98MB in 0.30374s).
```

Mettre la valeur correspondant à votre cas, attention au sens de rotation autour de l'axe.

TutoCFD - STAR-CCM+

File Edit Mesh Solution Tools Window Help

TutoCFD x Maillage x

Simulation Scene/Plot

TutoCFD

- Geometry
- Continua
- Parts Meshes
- Physics 1
- Regions
  - Region
    - Boundaries
    - Feature Curves
    - Physics Conditions
    - Physics Values
      - Axis
      - Motion Specification**
- Interfaces
- Derived Parts
- Solvers
- Stopping Criteria
- Solution Histories
- Solution Views
- Reports
- Monitors
- Plots
- Scenes
- Summaries
- Representations
- Tools

STAR-CCM+

Motion Specification - Properties x

Properties

Motion Stationary

Reference Frame Lab Reference Frame

Lab Reference Frame

Rotating

Reference Frame

Reference Frame to which the motion is relative to

Output - TutoCFD x

```
-----
Volume Extruder Operation: Volume Extruder 2 complete. CPU Time: 6.60, Wall Time: 6.80, Memory: 2859.25 MB
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Object state saved to /home/florent/Boulot/Ensam/Enseignement/UEI/BE_eolienne/SupportsTutos/TutoCFd/TutoCFD.sim (242.98MB in 0.30374s).
```

On affecte ce référentiel tournant à la "Region".

TutoCFD - STAR-CCM+

File Edit Mesh Solution Tools Window Help

TutoCFD x Maillage x

STAR-CCM+

TutoCFD

- Geometry
  - Continua
    - Parts Meshes
    - Physics 1
  - Regions
    - Region
      - Boundaries
        - Interface1
          - Interface1 [Interface 1]
          - Interface2
          - Interface2 [Interface 1]
          - Interface3
          - Interface3 [Interface 2]
          - Interface4
          - Interface4 [Interface 2]
        - Subtract Amont
          - Physics Conditions
            - Physics Values
              - Turbulence Intensity
              - Turbulent Viscosity Ratio
              - Velocity Magnitude
          - Subtract Aval
          - Subtract Eolienne
          - Subtract Tube
        - Feature Curves
        - Physics Conditions
        - Physics Values
      - Interfaces
      - Derived Parts

Velocity Magnitude - Properties

Properties

Method	Constant
Value	1.0 m/s
Dimensions	Velocity

Value

Constant profile value

Output - TutoCFD x

```
Volume Extruder Operation: Volume Extruder 2 complete. CPU Time: 6.60, Wall Time: 6.80, Memory: 2859.25 MB
Volume Meshing Pipeline Completed: CPU Time: 135.64, Wall Time: 134.58, Memory: 2859.25 MB
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```

On modifie la valeur de la vitesse en amont.

# Simulation et post-traitement

- ...