

Community Christmas Competition organized by Joszef Nagy:

Evaluation of Drag coefficient of monkey head Suzanne

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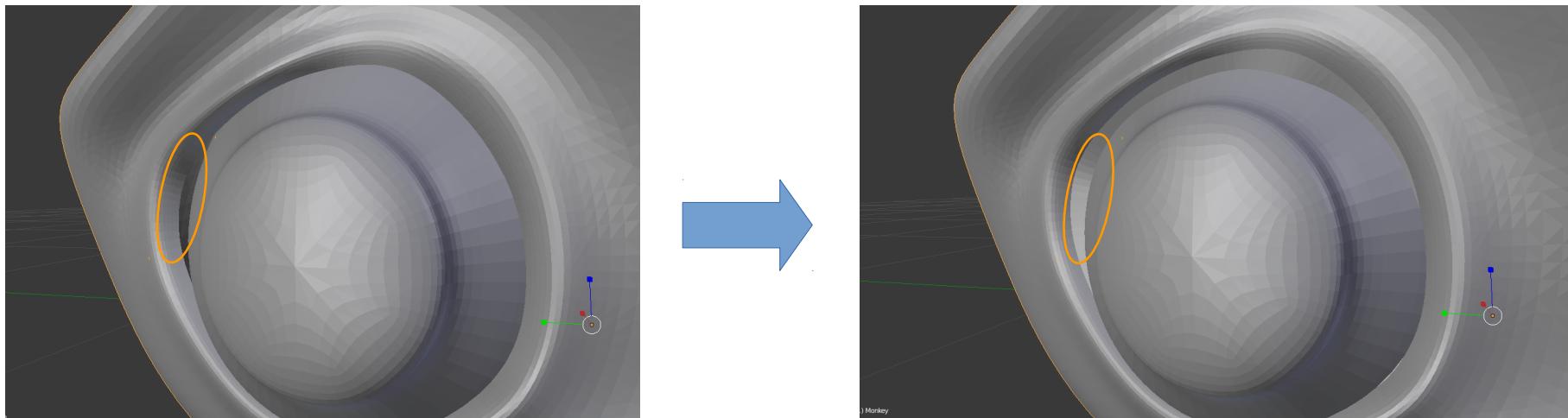
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Preprocessing with OpenSource Tools

- Closing the gap between the eyes and the head with blender



- Derive model without intersecting parts by subtraction of monkey head from Cube (boolean operation) with blender → export stl-file
- Delete illegal vertices with meshLab → final stl-file for usage with SnappyHexMesh

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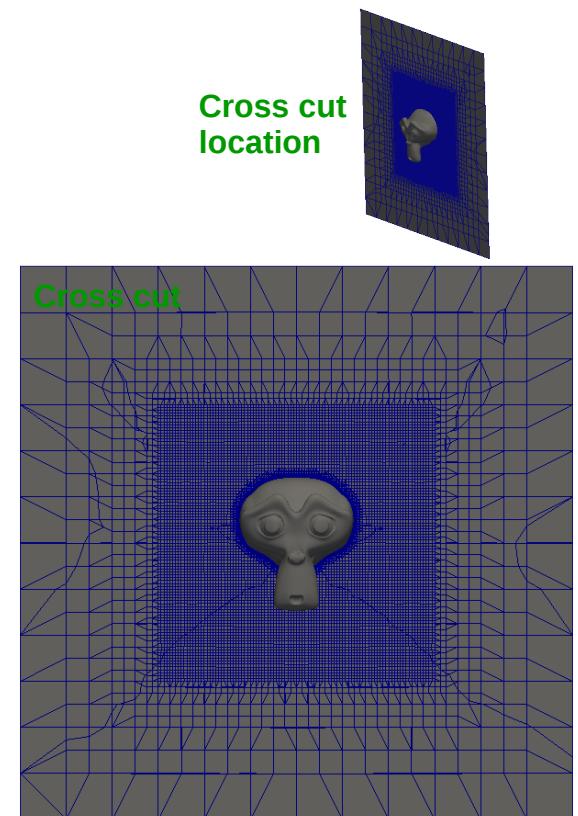
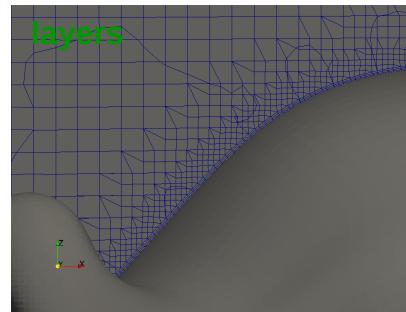
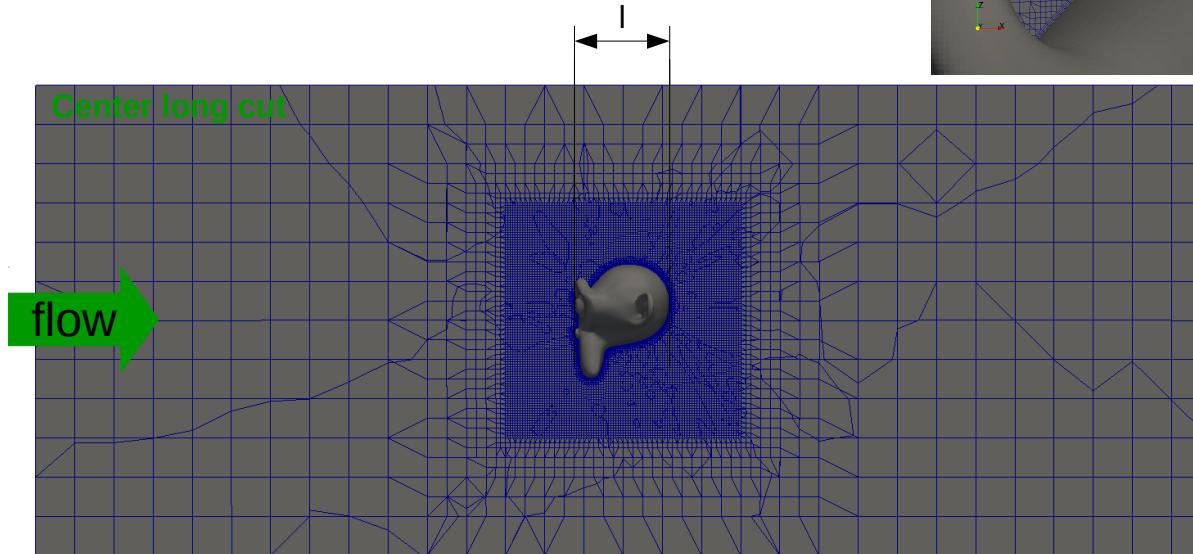
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Meshing with SnappyHexMesh

- Number of cells: 1.6 mio
- Snapshots of the mesh:



- Frontal area $A=2.553\text{m}^2$ and characteristic length $l= 1.6\text{m}$ for Re calculation was derived with help from paraview
- Solver: simpleFoam of OpenFOAM 5.0
- Turbulence model: kOmegaSST

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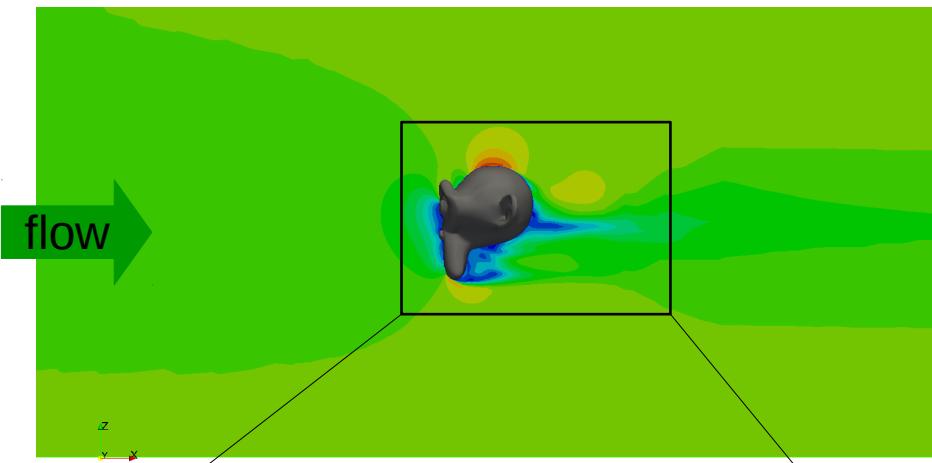
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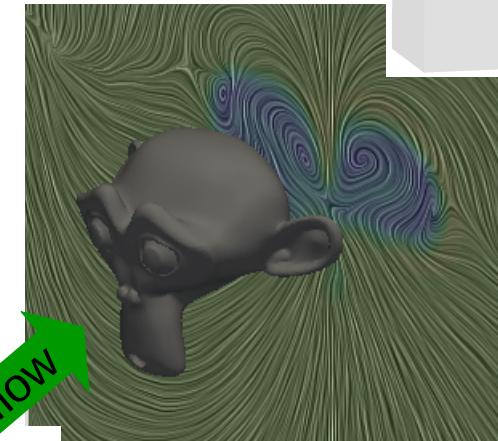
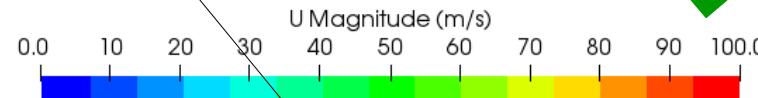
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Results for $Re=6.4*10^6$

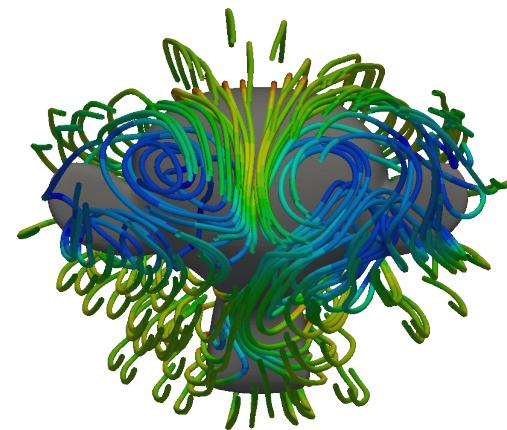
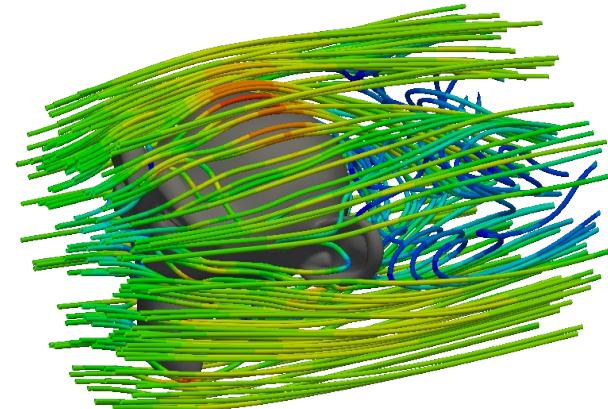
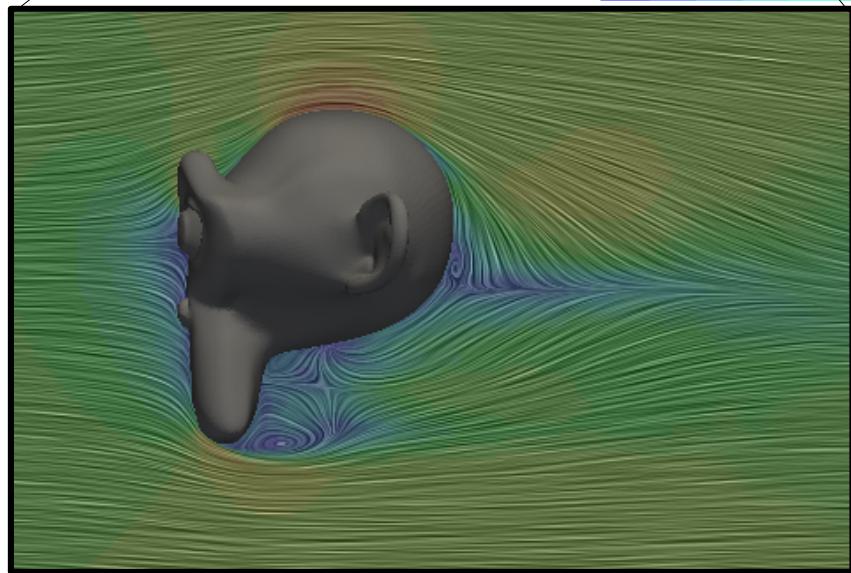
Location of plane



Central longitudinal cut



Vortex behind the monkey head
due to flow separation



View from behind

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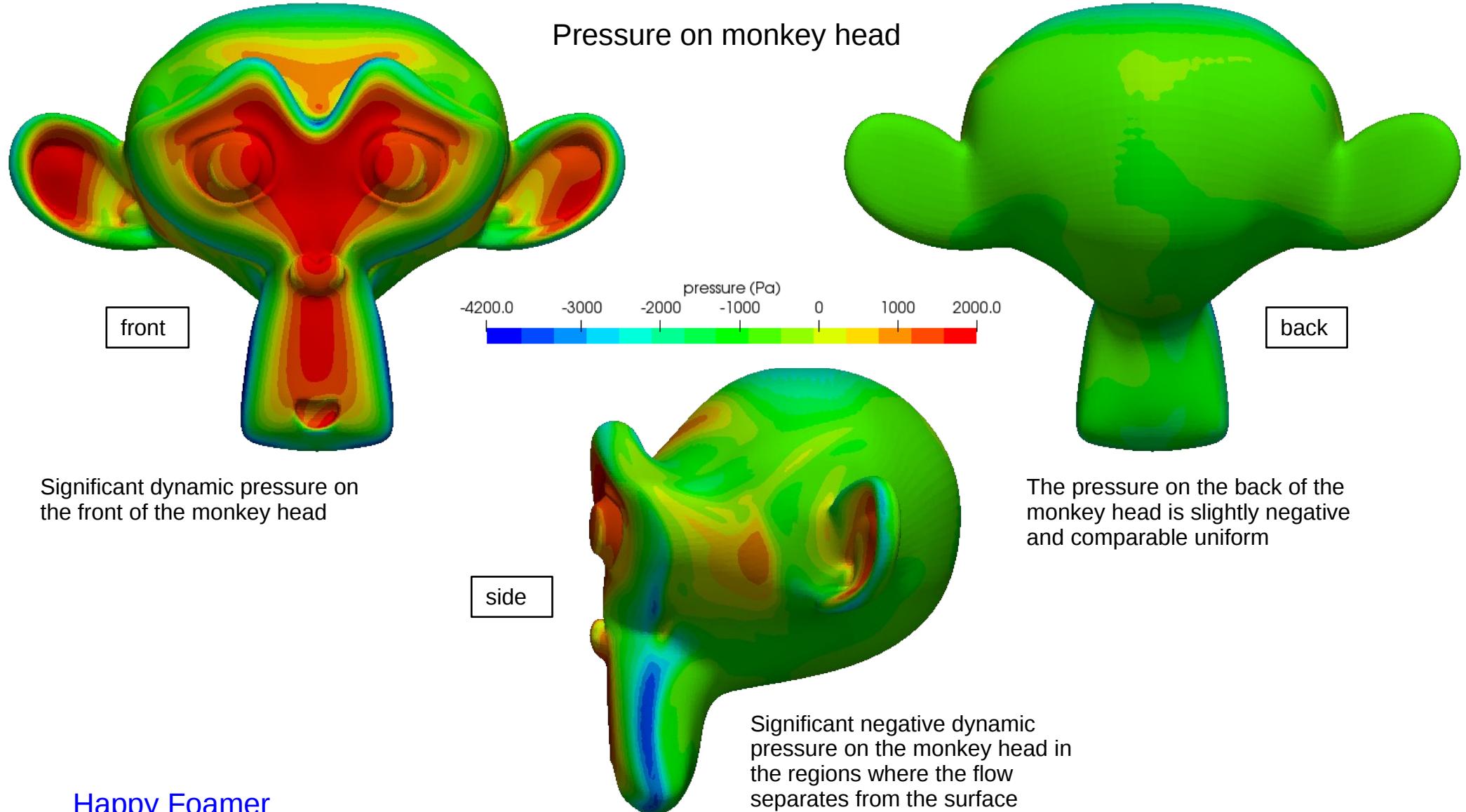
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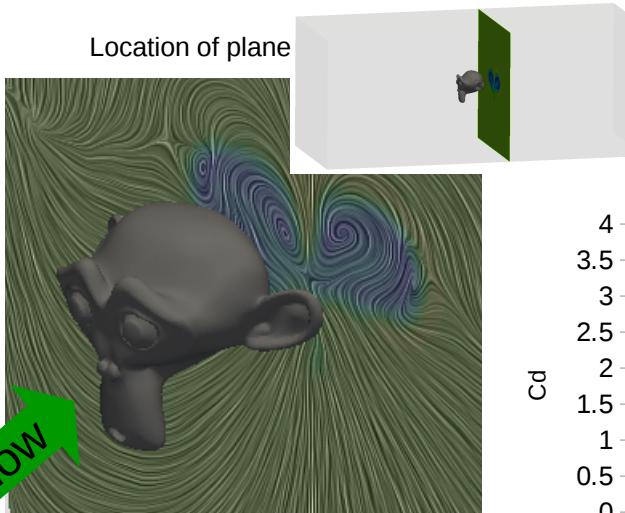
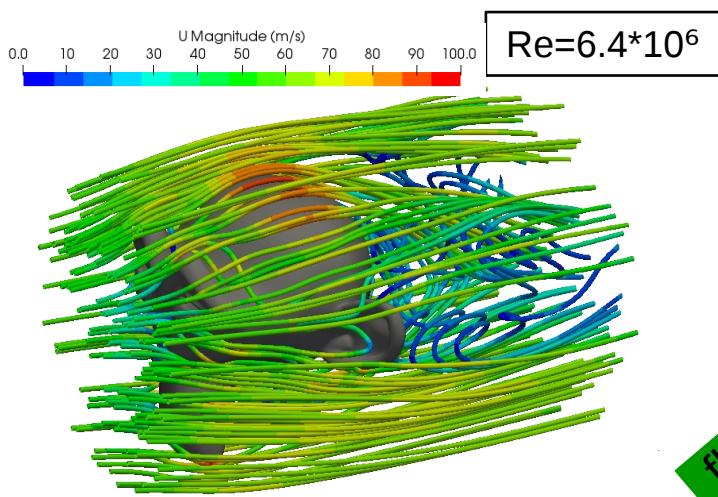
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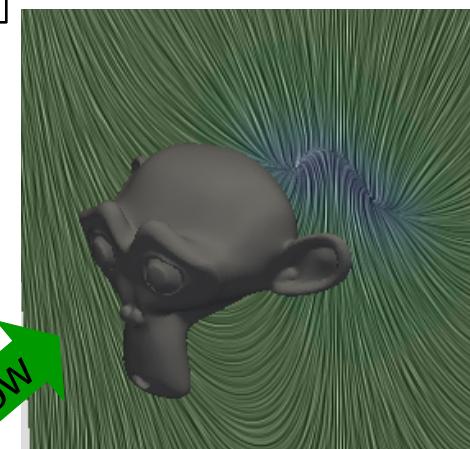
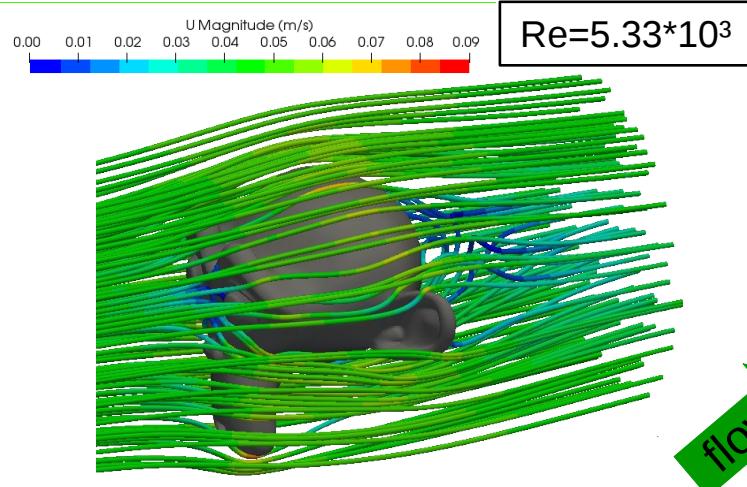
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Result: Cd depending on Re



Fully turbulent boundary layer flow around the monkey head with significant flow separations



Nearly laminar flow around the monkey head with very few flow separation

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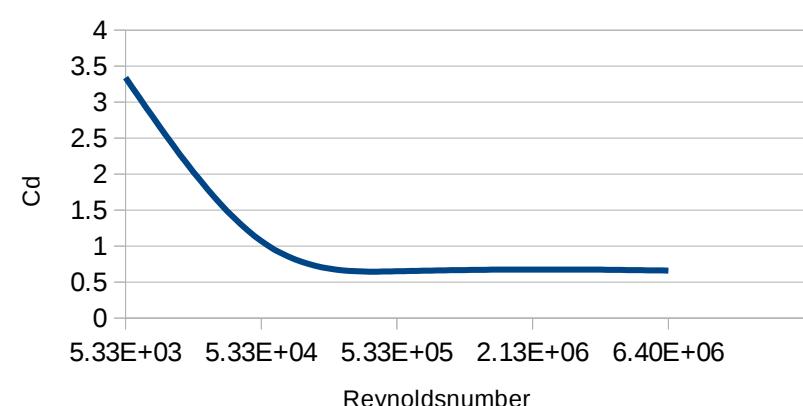
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With increasing Reynolds number the drag coefficient is decreasing till a fully turbulent boundary layer flow is reached. Once this is reached the drag coefficient is nearly constant for further increase of the Reynolds number.

Anyhow one need to be aware of that the drag force itself is still increasing with growing Reynolds numbers.



**Extra page with name
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