# Introduction to CFD using OpenFOAM


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Indian Institute of Technology, Bombay

# Outline

- Things to understand before starting a subject/course

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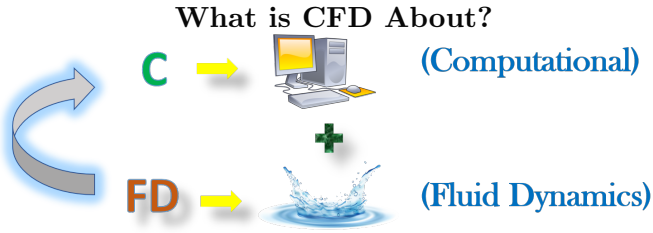


- Basically.... Investigate Fluid Dynamics (i.e, Fluid flow process) phenomenon using computers !

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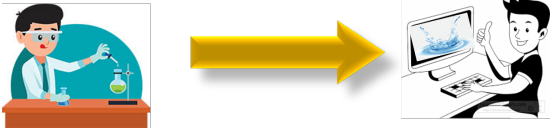

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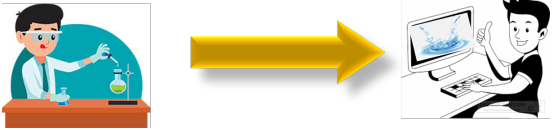

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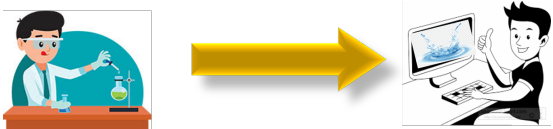

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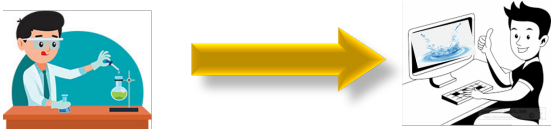

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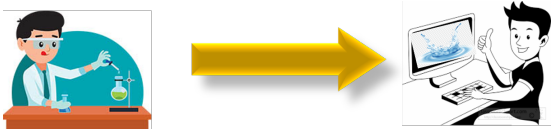

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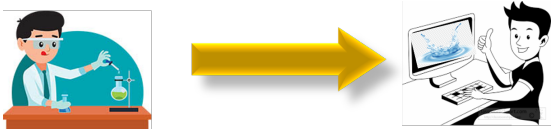

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Development of Solver i.e, computer code – Use any language !

Application for specific problem Eg. Flow over cylinder

Analysis of Results – Make Scientific / Engineering exciting movies !

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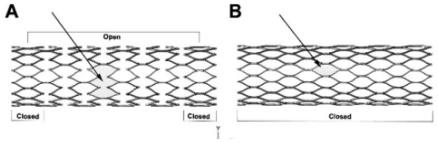

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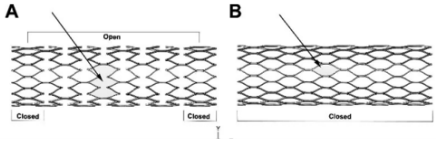
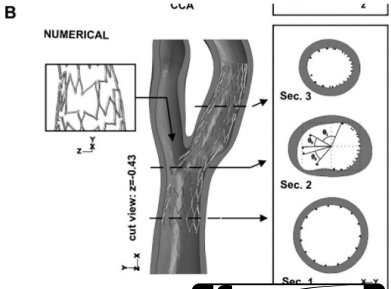



- CFD analysis can be performed on geometry extracted from MRI scan to study vital parameters and check which design performs better !



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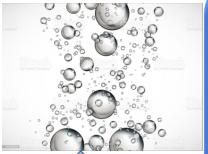

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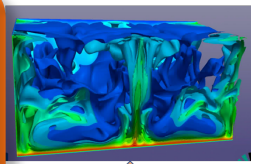
**Heat Transfer Study:**

- Differences in temperature may lead to fluid flow variation and variation in flow velocity effects temperature.
- This 2-way interaction finds application in geophysical flows, heat exchangers etc.



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- Many Solvers are available like Fluent (ANSYS), ADINA, COMSOL etc... But these softwares need to be purchased.
- OpenFOAM is an open-source software ... So... It's free of cost ! Also, we can tweak the codes to suit our problem statement.

- Wikipedia[2] Says this

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- Developers are spread across globe including India. A user can also contribute towards development in special cases !

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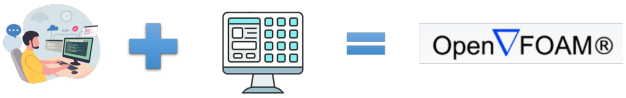

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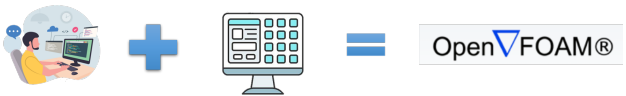


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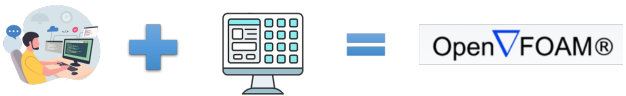


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SINGLE-PHASE MULTI-PHASE HEAT-TRANSFER

FLUID-STRUCTURE-INTERACTION

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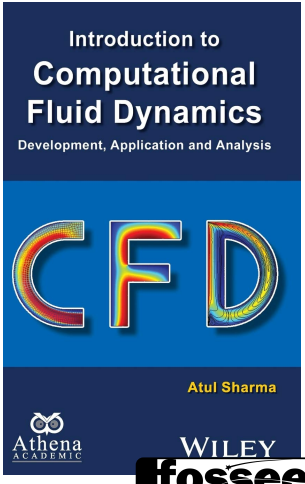
Next Class, we shall see a brief overview of Development, Application and Analysis which is crux of CFD !

1. Sharma, A. (2016). Introduction to computational fluid dynamics: development, application and analysis. John Wiley & Sons.
2. https://en.wikipedia.org/wiki/OpenFOAM
3. https://www.openfoam.com/
4. Conti, M., Loo, D. V., Auricchio, F. et al. (2011). Impact of carotid stent cell design on vessel scaffolding: a case study comparing experimental investigation and numerical simulations. Journal of Endovascular Therapy, 18(3), 397-406.



Thank you for listening!

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