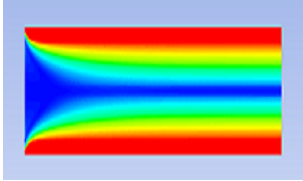
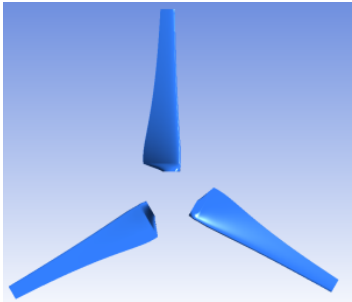
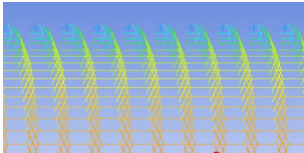
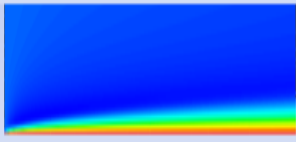


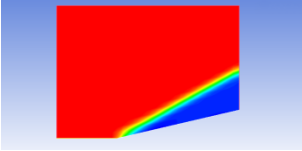
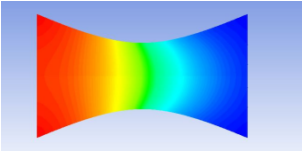
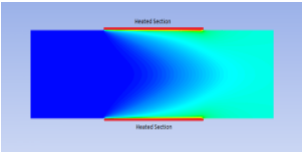
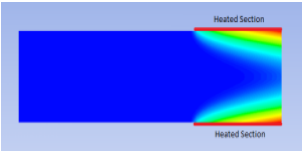
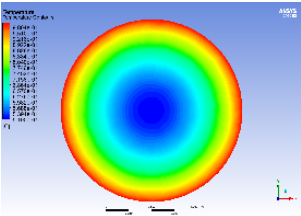
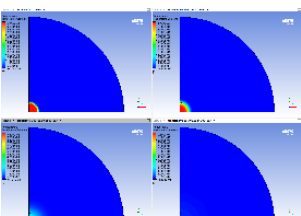
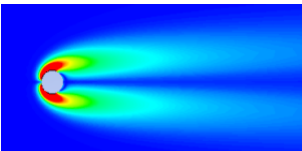
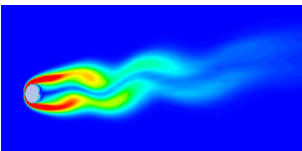
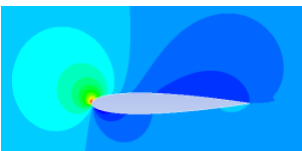
# FLUENT Learning Modules

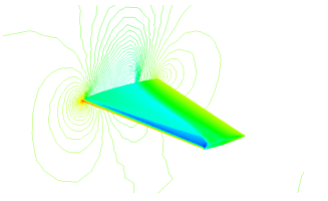
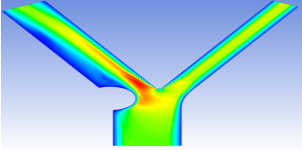
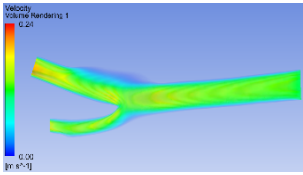
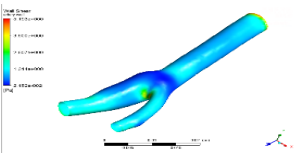
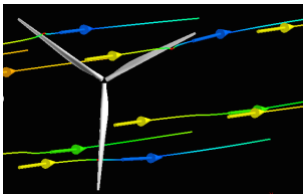
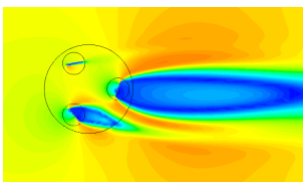
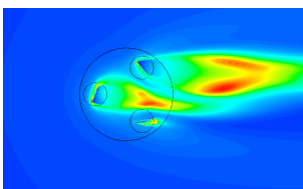
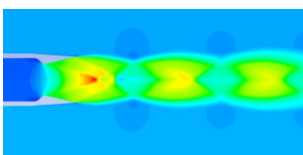
## List of learning modules

The following tutorials show how to solve selected fluid flow problems using *ANSYS Fluent*. The tutorial topics are drawn from Cornell University courses, the [Prantil et al](#) textbook, student/research projects etc. If a tutorial is from a course, the relevant course number is indicated below. All tutorials have a common structure and use the same high-level steps starting with *Pre-Analysis* and ending with *Verification and Validation*. *Pre-Analysis* includes hand calculations to predict expected results while *Verification and Validation* can be thought of as a formal process for checking computer results. Both these steps are extremely important in practice though often overlooked. The pedagogical philosophy behind these modules is discussed in [this article](#) from the *ANSYS Advantage* magazine.

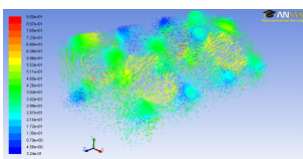
## Fluent tutorials

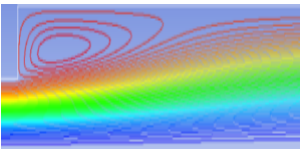
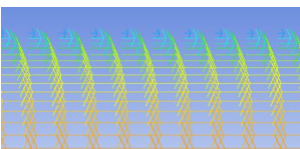
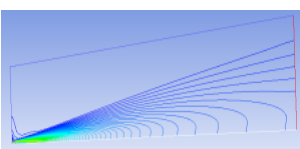
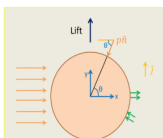
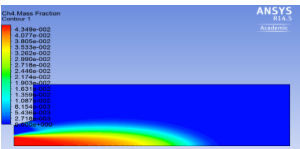
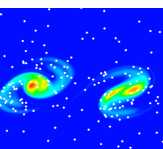
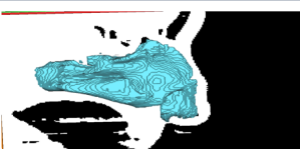
|                                                                                                                                                                                          |                                                |                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|------------------------------------------------------------------------------|
|                                                                                                         | <a href="#">What's Under the CFD Blackbox?</a> | <a href="#">ENGR2000X A Hands-on Introduction to Engineering Simulations</a> |
| $\rho(\vec{V} \cdot \nabla)\vec{V} = -\nabla p + \mu \nabla^2 \vec{V}$<br>$\nabla \cdot \vec{V} = 0$                                                                                     | <a href="#">Big Ideas: Fluid Dynamics</a>      | <a href="#">ENGR2000X A Hands-on Introduction to Engineering Simulations</a> |
| $\dot{x}_{1-2} = u_{1-2} \Delta y(i) + \text{Error}$<br>$u_{1-2} = \frac{u_1 + u_2}{2} + \text{Error}$<br>$\dot{x}_{1-2} = \left(\frac{u_1 + u_2}{2}\right) \Delta y + 2 \text{ Errors}$ | <a href="#">Computational Fluid Dynamics</a>   | <a href="#">ENGR2000X A Hands-on Introduction to Engineering Simulations</a> |
|                                                                                                       | <a href="#">Laminar Pipe Flow</a>              | <a href="#">ENGR2000X A Hands-on Introduction to Engineering Simulations</a> |
|                                                                                                       | <a href="#">Wind Turbine Blade</a>             | <a href="#">MAE 4020/4021/5020</a>                                           |
|                                                                                                       | <a href="#">Turbulent Pipe Flow</a>            | <a href="#">MAE 4230/MAE 5230</a>                                            |
|                                                                                                       | <a href="#">Flat Plate Boundary Layer</a>      | <a href="#">MAE 4230/MAE 5230/MAE 6510</a>                                   |

|                                                                                     |                                     |                   |
|-------------------------------------------------------------------------------------|-------------------------------------|-------------------|
|    | Supersonic Flow Over a Wedge        | MAE 4230/MAE 5230 |
|    | Compressible Flow in a Nozzle       | MAE 4230/MAE 5230 |
|    | Turbulent Forced Convection         | MAE 4272          |
|    | Laminar Convection: Nusselt Problem | MAE 3240 (Summer) |
|   | 3D Steady Diffusion                 | BME 2000          |
|  | 2D Transient Diffusion              | BME 2000          |
|  | Steady Flow Past a Cylinder         | MAE 5230          |
|  | Unsteady Flow Past a Cylinder       | MAE 5230          |
|  | Flow over an Airfoil                | MAE 5230          |

|                                                                                     |                                                            |                   |
|-------------------------------------------------------------------------------------|------------------------------------------------------------|-------------------|
|    | 3D Transonic Flow over a Wing                              | MAE 5230          |
|    | 2D Bifurcating Artery                                      | MAE 6690          |
|    | 3D Bifurcating Artery (steady)                             | BME 2000          |
|    | 3D Bifurcating Artery (unsteady)                           | MAE 6690          |
|   | Wind Turbine Blade FSI (Part 1)<br>(Advanced)              | MAE 5230/MAE 5020 |
|  | Vertical Axis Wind Turbine (Part 1)<br>(Advanced)          |                   |
|  | Vertical Axis Wind Turbine (Part 2)<br>(Advanced)          |                   |
|  | Over-expanded Nozzle<br>(Advanced)<br>[Under-Construction] | MAE 4230          |

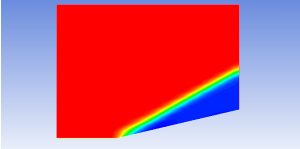
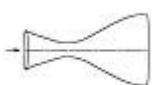
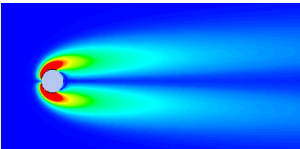
### Some other Fluent tutorials

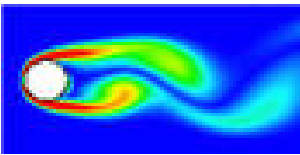
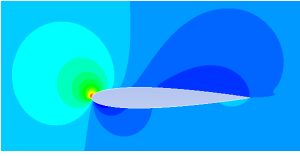
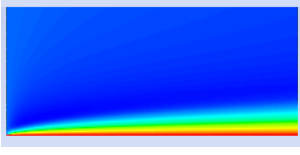
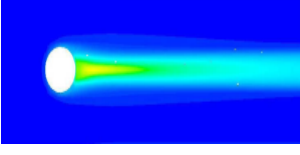
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|-------------------------------------------------------------------------------------|------------------------------------------|--------------------|
|  | 3D Convection through an Electronics Box | Mars Rover Project |
|-------------------------------------------------------------------------------------|------------------------------------------|--------------------|

|                                                                                     |                                            |                                  |
|-------------------------------------------------------------------------------------|--------------------------------------------|----------------------------------|
|    | Sudden Expansion in Laminar Pipe Flow      | University of California, Irvine |
|    | Turbulent Pipe Flow (LES)                  | Stephen B. Pope Research Group   |
|    | Turbulent Jet (k-epsilon model)            | MAE 7340                         |
|    | User Defined Functions                     | MAE 4230//MAE 5230               |
|    | Partially Premixed Combustion              |                                  |
|   | Particles in a Periodic Double Shear Layer | Donald L Koch Research Group     |
|  | Nasal Airway Model                         | Cornell M.Eng Project            |

## Older Tutorials

These tutorials are for older version of FLUENT and are no longer being updated. They use GAMBIT for meshing.

|                                                                                     |                               |                  |
|-------------------------------------------------------------------------------------|-------------------------------|------------------|
|  | Supersonic Flow Over a Wedge  | ANSYS FLUENT 6.3 |
|  | Compressible Flow in a Nozzle | ANSYS FLUENT 6.3 |
|  | Steady Flow Past a Cylinder   | ANSYS FLUENT 6.3 |

|                                                                                   |                                     |                  |
|-----------------------------------------------------------------------------------|-------------------------------------|------------------|
|  | Unsteady Flow Past a Cylinder       | ANSYS FLUENT 6.3 |
|  | Flow over an Airfoil                | ANSYS FLUENT 6.3 |
|  | Forced Convection over a Flat Plate | ANSYS FLUENT 6.3 |
|  | Flow past a Sphere                  | ANSYS FLUENT 6.3 |

## Computational Fluid Dynamics