



University of Stuttgart
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Beamer Template

Example

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Outline



Navier-Stokes Equations

an example

Mass and Momentum Conservation

Images

an example

Videos

an example

Code and Color Blocks

fragile frames

Working with TIKZ

Animations

Navier-Stokes Equations

The Navier-Stokes equations mathematically express **momentum** and **mass continuity** for **Newtonsche fluids**.

Mass conservation

$$\frac{\partial \rho}{\partial t} + \frac{\partial \rho u_x}{\partial x} + \frac{\partial \rho u_y}{\partial y} + \frac{\partial \rho u_z}{\partial z} = 0$$

Momentum conservation

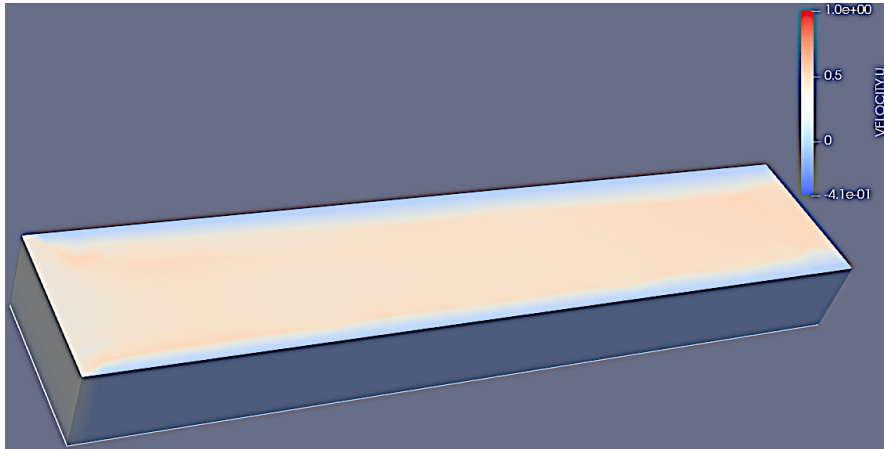
$$\rho g_x - \frac{\partial p}{\partial x} + \mu \left(\frac{\partial^2 u_x}{\partial x^2} + \frac{\partial^2 u_x}{\partial y^2} + \frac{\partial^2 u_x}{\partial z^2} \right) = \rho \left(\frac{\partial u_x}{\partial t} + u_x \frac{\partial u_x}{\partial x} + u_y \frac{\partial u_x}{\partial y} + u_z \frac{\partial u_x}{\partial z} \right)$$

$$\rho g_y - \frac{\partial p}{\partial y} + \mu \left(\frac{\partial^2 u_y}{\partial x^2} + \frac{\partial^2 u_y}{\partial y^2} + \frac{\partial^2 u_y}{\partial z^2} \right) = \rho \left(\frac{\partial u_y}{\partial t} + u_x \frac{\partial u_y}{\partial x} + u_y \frac{\partial u_y}{\partial y} + u_z \frac{\partial u_y}{\partial z} \right)$$

$$\rho g_z - \frac{\partial p}{\partial z} + \mu \left(\frac{\partial^2 u_z}{\partial x^2} + \frac{\partial^2 u_z}{\partial y^2} + \frac{\partial^2 u_z}{\partial z^2} \right) = \rho \left(\frac{\partial u_z}{\partial t} + u_x \frac{\partial u_z}{\partial x} + u_y \frac{\partial u_z}{\partial y} + u_z \frac{\partial u_z}{\partial z} \right)$$

Images

Images: an example



A figure caption

Videos

Videos

an example



An example video with thumbnail (source: [Schwindt 2015](#))

Code and Color Blocks

Code and Color Blocks: fragile frames

An example FRAGILE frame with code blocks - attention: [*fragile*] is needed for code blocks

```
git status
[optional] git diff
git add .
git commit -m "Modified ..."

git pull --rebase
git push
```

- verify files that you modified
- see what exactly changed (optional)
- stage changed files ~> DOT adds all
- commit changes and provide a message
- verify integrity of local and remote changes
- push changes

Inline code blocks

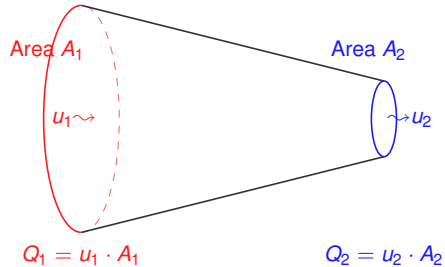
Use a colorbox to display code or no colorbox to display code

Working with TIKZ

Working with TIKZ

An example for creating a tikzpicture

- more predefined shapes can be read from the beamerlww.sty style file



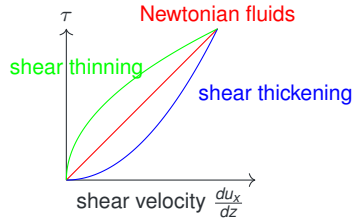
Animations

Animations

Another TIKZ picture that appears only on click

Animations

Another TIKZ picture that appears only on click





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Thank you for listening



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