

## TUTORIAL OF FIRST DAY

- Install docker and the provided image
- Introduction to deterministic finite element solving
- Implement a simple solver using the FEniCS library
- Introduction to random fields and parametrization
- Implement a finite element solver using FEniCS having a variable coefficient

### 1. INSTALL DOCKER

For ubuntu use

<https://docs.docker.com/install/linux/docker-ce/ubuntu/>

For mac use

<https://docs.docker.com/docker-for-mac/install/>

#### 1.1. Install the docker image via docker file.

- Navigate into folder 'docker'
- Create the image from the Dockerfile (the DOT is important!)

```
docker build -t daedalus .
```

- optional one can pass a version or state of the container by

```
docker build -t daedalus:dev .
```

#### 1.2. Create a docker container to run code in it.

- Create the container

```
docker create -ti
-v /{path to}/daedalus18/Notebooks:/home/fenics/shared/
-p 127.0.0.1:8888:8888 daedalus
```

- '-ti' let you provide a name for the container and gives it the interactive flag
- '-v /localPath:/remotePath' mounts the local volume into the container. Here, the user directory in the docker container is '/home/fenics/shared'. We want you to load the provided Notebooks into the docker container.
- '-p' is used for port-forwarding to run the Jupyter Notebook Server
- 'daedalus' is the name of the image given in section 1.1.

- start the container

```
docker container start {ID}
```

- attach to the running container

```
docker container attach {ID}
```

This might take a while!

where ID must be substituted by the docker container ID or the container name alias.

- Run

```
docker ps -a
```

to see the container information.

- detaching by simply calling 'exit'. Afterwards container must be started again.
- when reattaching, the docker bash waits for an input, just type for example 'ls' and the terminal reacts.

**1.3. Test your environment.** Try the following commands

- `python -c'import dolfin'`
- `python -c'import xerus'`
- `python -c'import matplotlib'`

**1.4. Start the Jupyter Notebook server.** If you are running the docker container and are attached to it, you can start the jupyter notebook server by calling

```
jupyter-notebook --ip=0.0.0.0
```

The server should start now and provide a link to an address on the remote machine. Copy the token!

Then, open a browser on your local machine and type in the address bar

```
localhost:8888
```

Paste the token!