

# LMC 3

# Achievements to date :

- Overview of the company (WPI)
- AM process familiarisation (WPI)
- Report on AM Business Model (WPI)
- OpenFoam familiarisation (WP2)
- Conjugate heat transfer in OpenFoam (WP2)
- CFD of a circular to rectangular nozzle (WP2)
- Heat exchanger design training (WP3)
- Technical challenges and competitor analysis (WP3)

## Work on progress :

CFD characterisation of the pressure drop and heat transfer inside gyroid lattices (WP4)

1- Generation of the surfaces

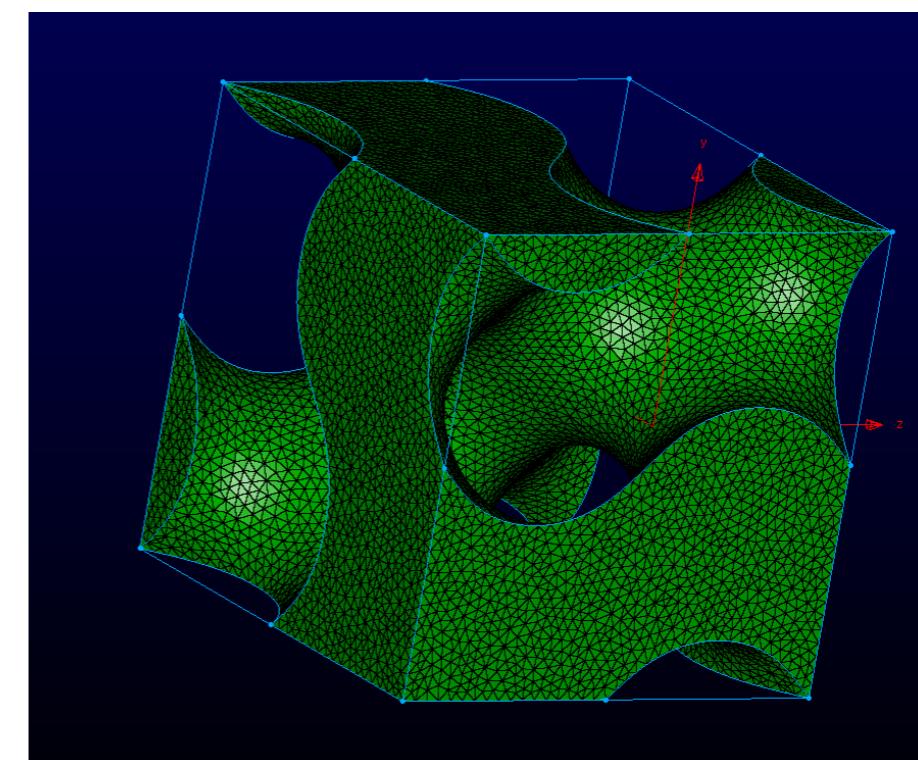
2- CFD study

Characterisation of the heat transfer and pressure drop in the lattice structure

3- Lattices builds and CT scans

4- CFD on the CT scans

5- Testing



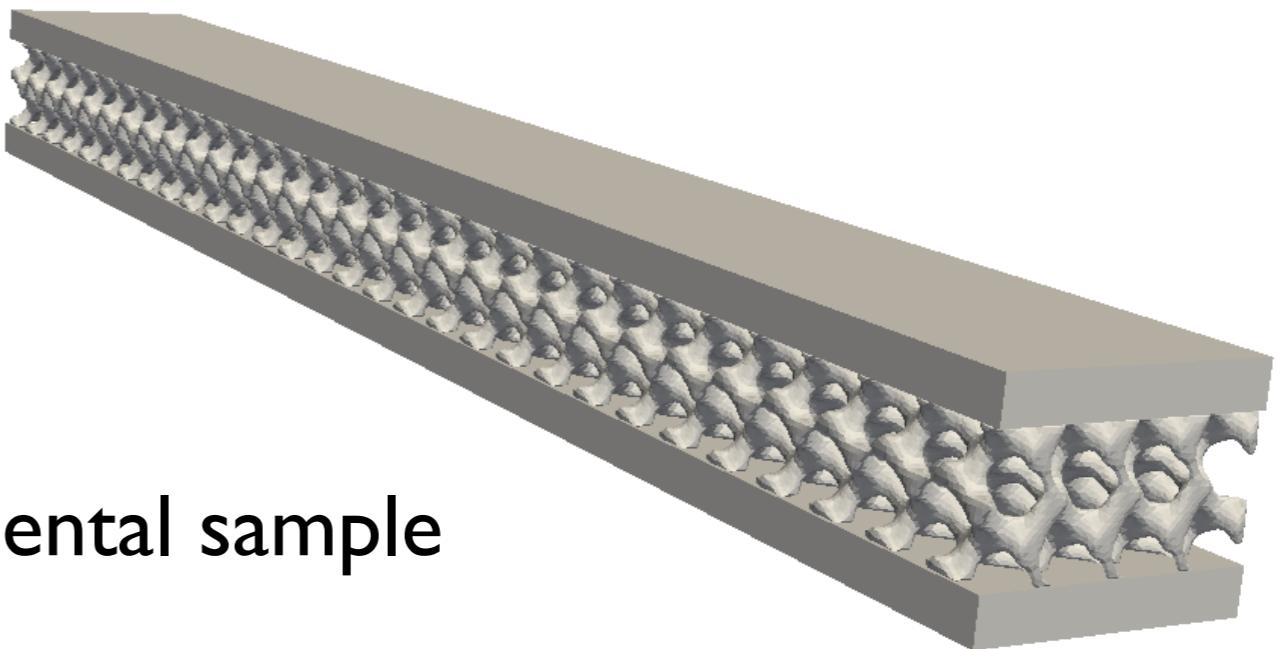
## Work on progress :

CFD characterisation of the pressure drop and heat transfer inside gyroid lattices (WP4)

Change of testing sample size :

1) Validation : CFD of the experimental sample

2) Performance study : CFD simulations using cyclic boundary conditions

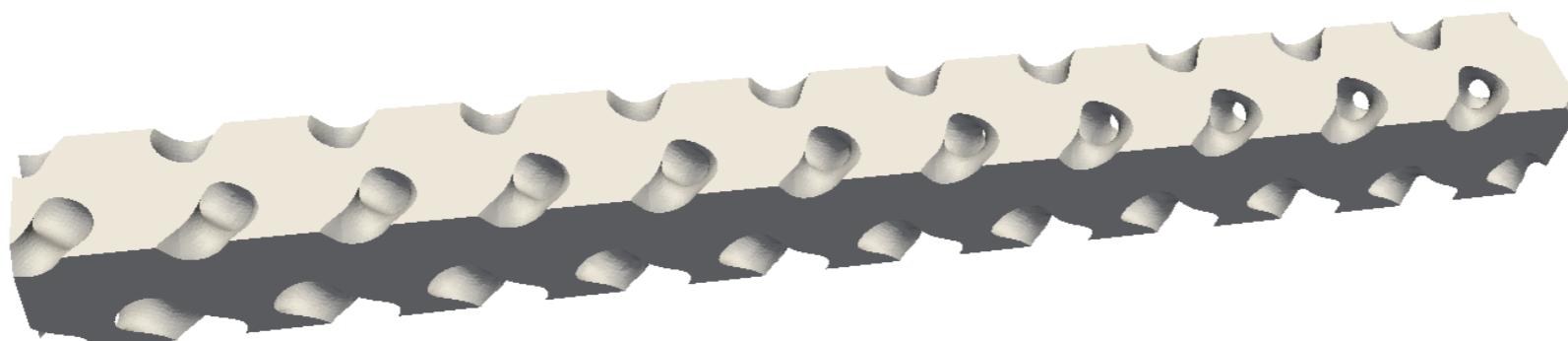


## Work on progress :

CFD characterisation of the pressure drop and heat transfer inside gyroid lattices (WP4)

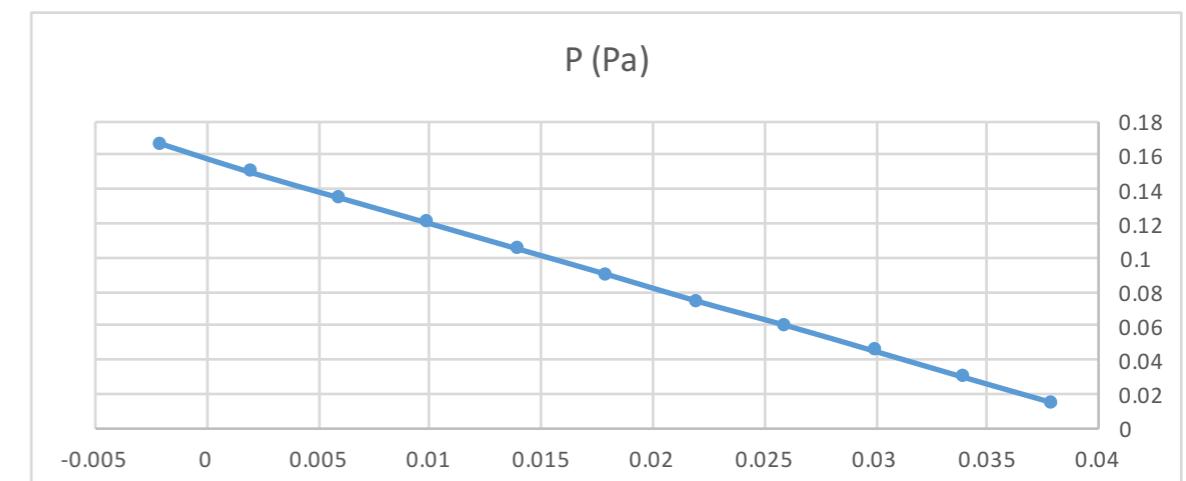
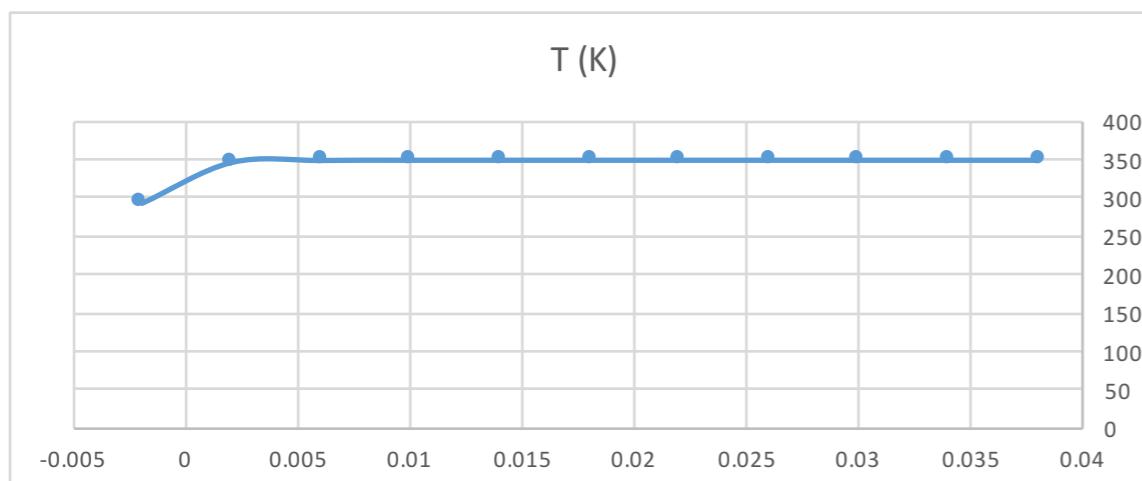
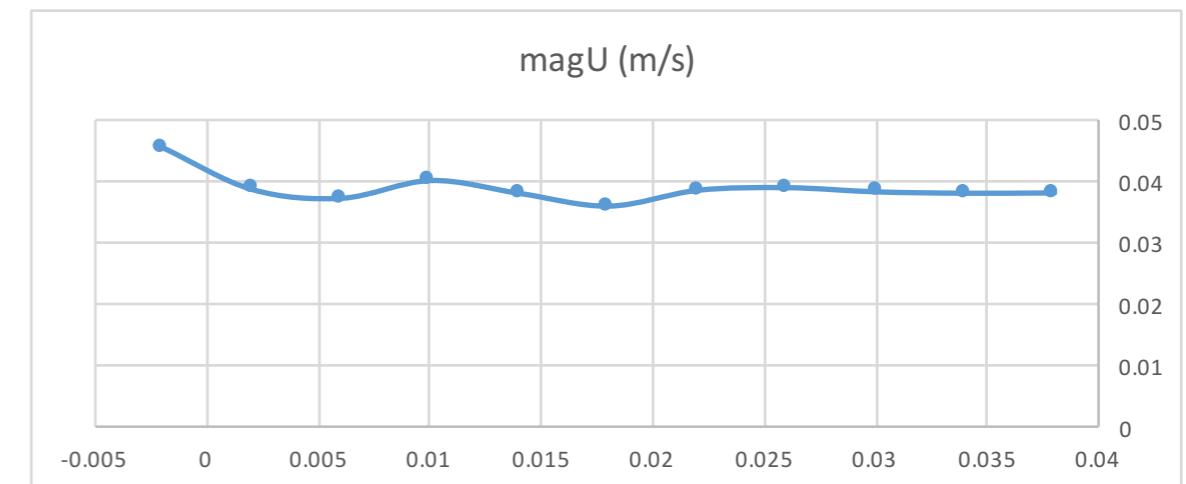
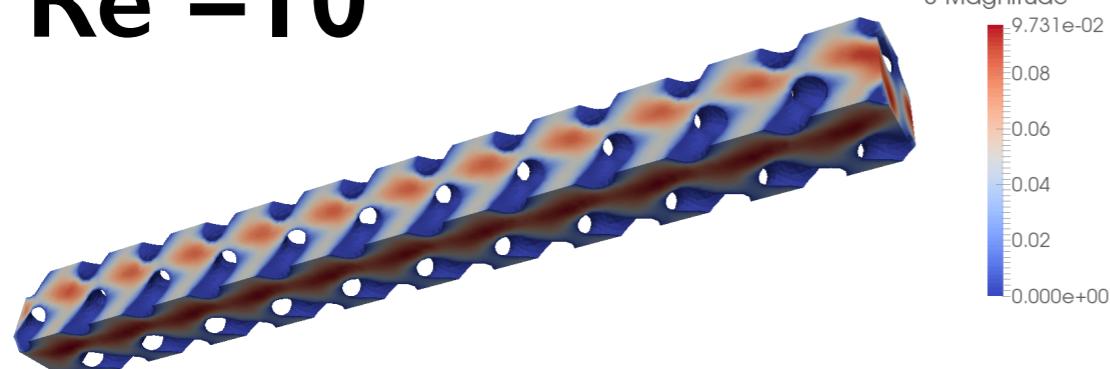
### Performance study :

- Several cells in the flow directions
- Cyclic boundary conditions in the other directions
- Analysis of the flow parameters after flow development
- Fixed wall temperature



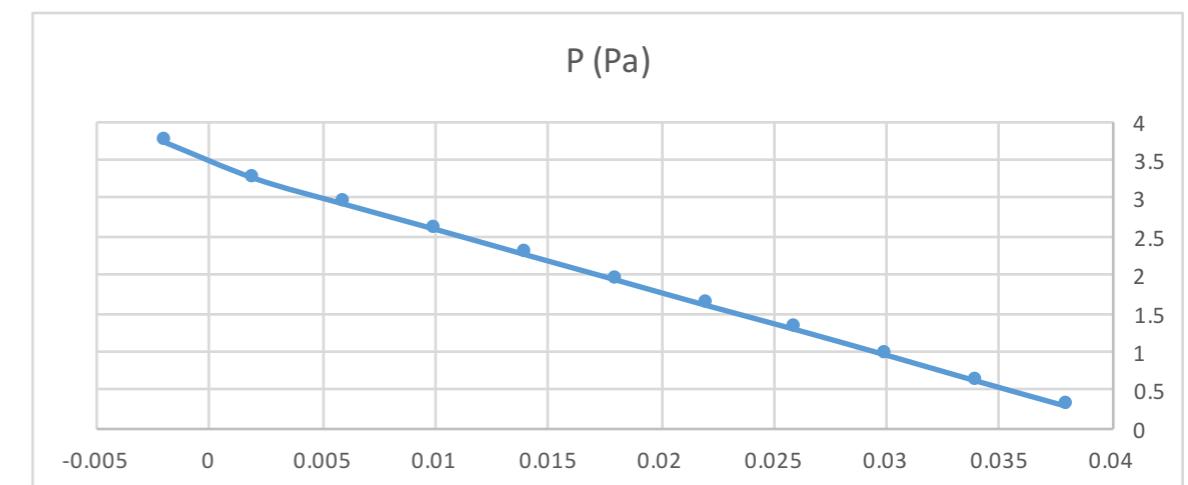
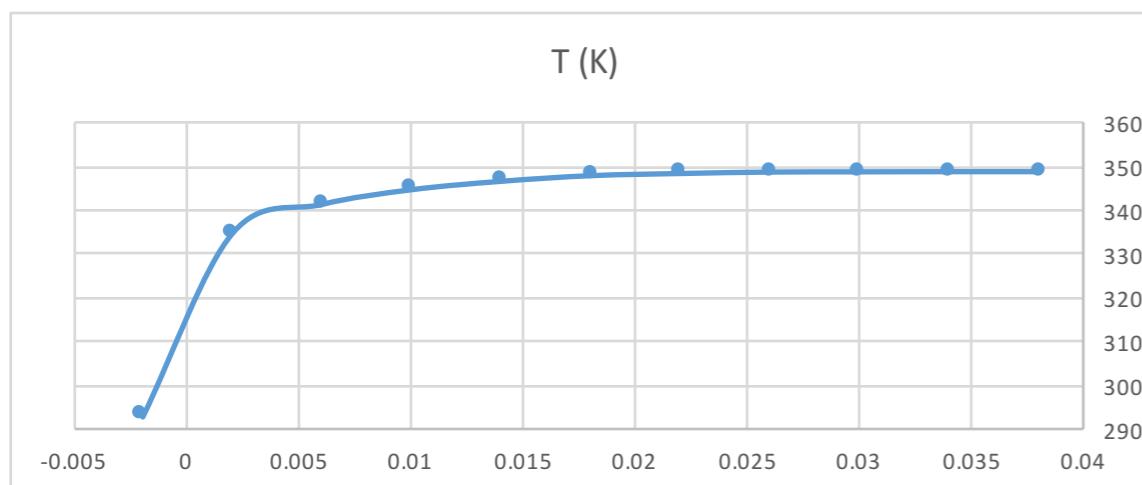
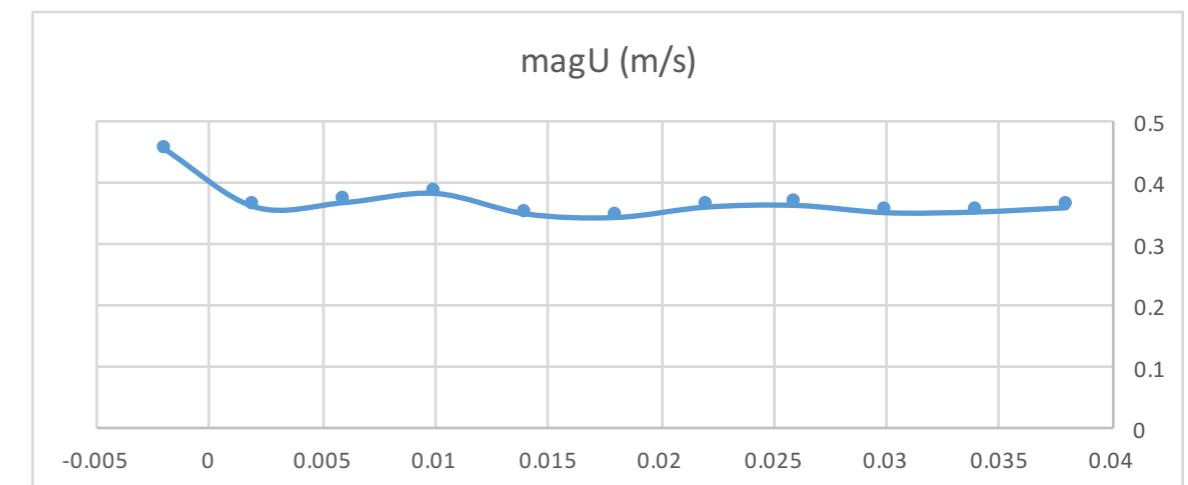
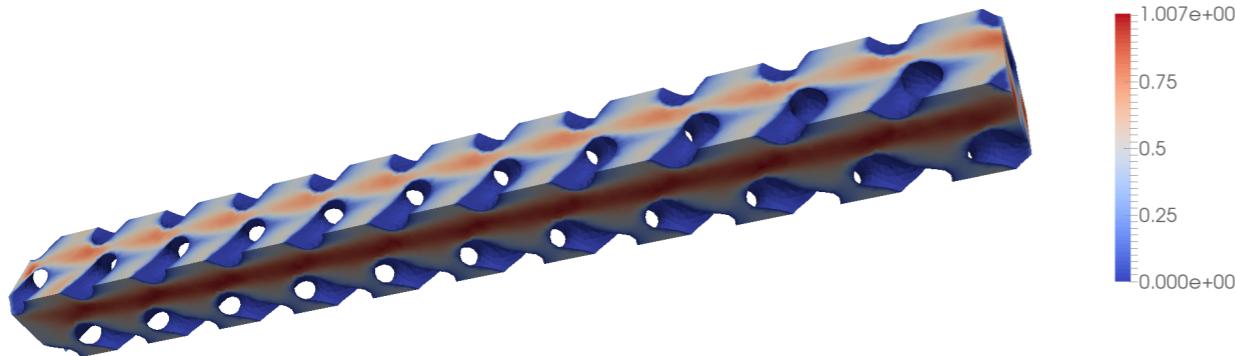
## Performance study :Volume fraction 30%

**Re = 10**



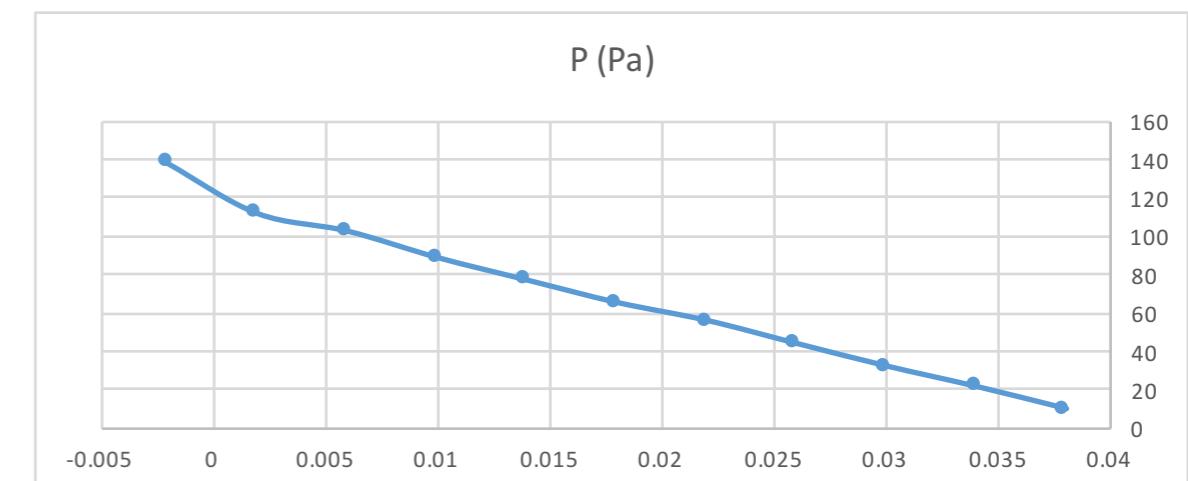
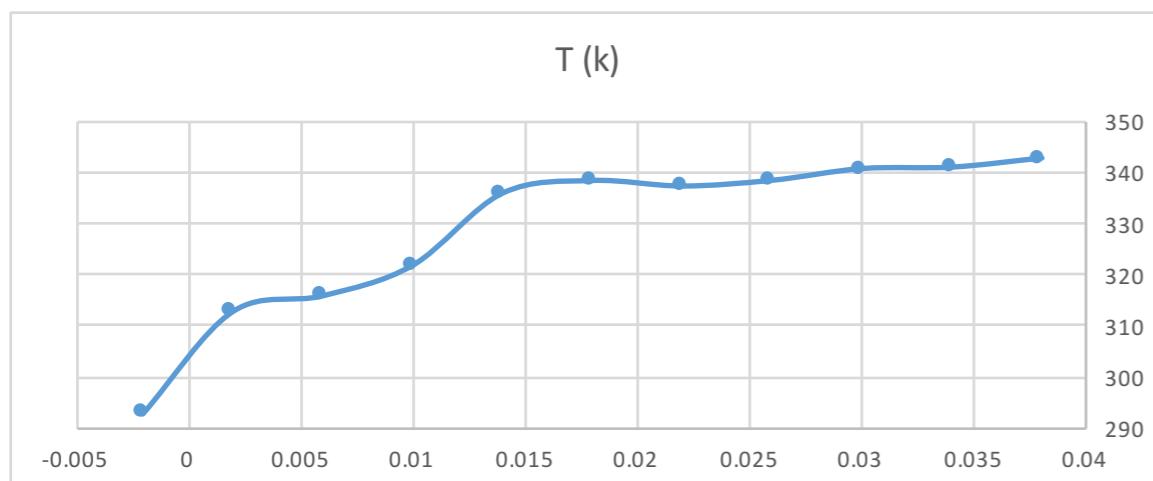
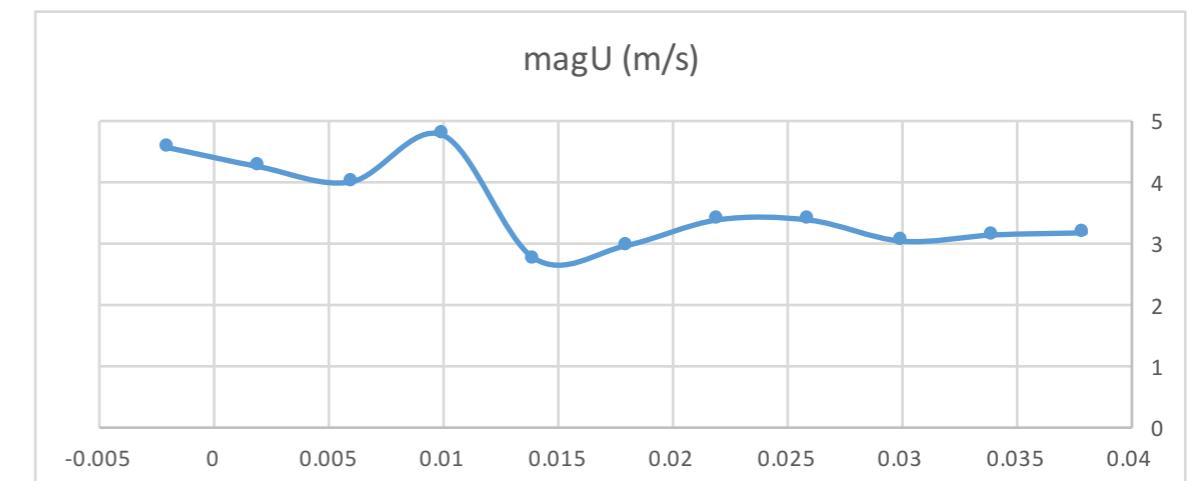
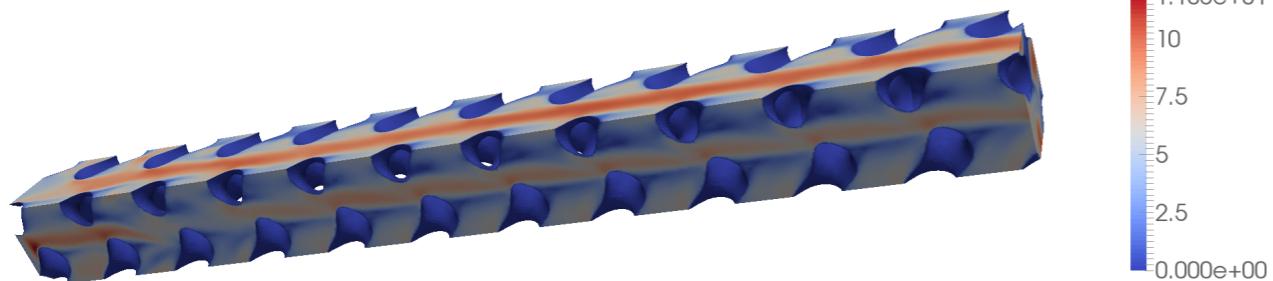
## Performance study : Volume fraction 30%

**Re = 100**



# Performance study :Volume fraction 30%

**Re = 1000**



# Proposal for future actions :

- Analysis of the AM value chain (WP1)

01/05/16

- CFD simulations on the lattices with automation (WP4)

01/06/16

- Final report including validation (WP4)

01/07/16

# Training achieved :

- CFD conference
- Paraview event day
- 3 days training on Pointwise
- 3rd UK and Ireland OpenFoam User meeting
- First KTP Module
- CFD classes at University of Exeter
- Second KTP Module
- Online course about Python

# Proposal for training/personal development :

Simpleware training

CMI Certificate ( 1250 £ )

11th OpenFOAM Workshop

3rd UK and Ireland OpenFoam User meeting

KTP Associates Conference

# Overall benefits :

For the university :

For the company :

- OpenFoam knowledge

For the associate :

- Heat Exchanger design knowledge
- OpenFoam and Pointwise knowledge
- General CFD knowledge
- Additive Manufacturing familiarisation
- Attendance of the 3rd UK and Ireland OpenFoam User meeting
- Attendance of the KTP Modules**
- Python training**