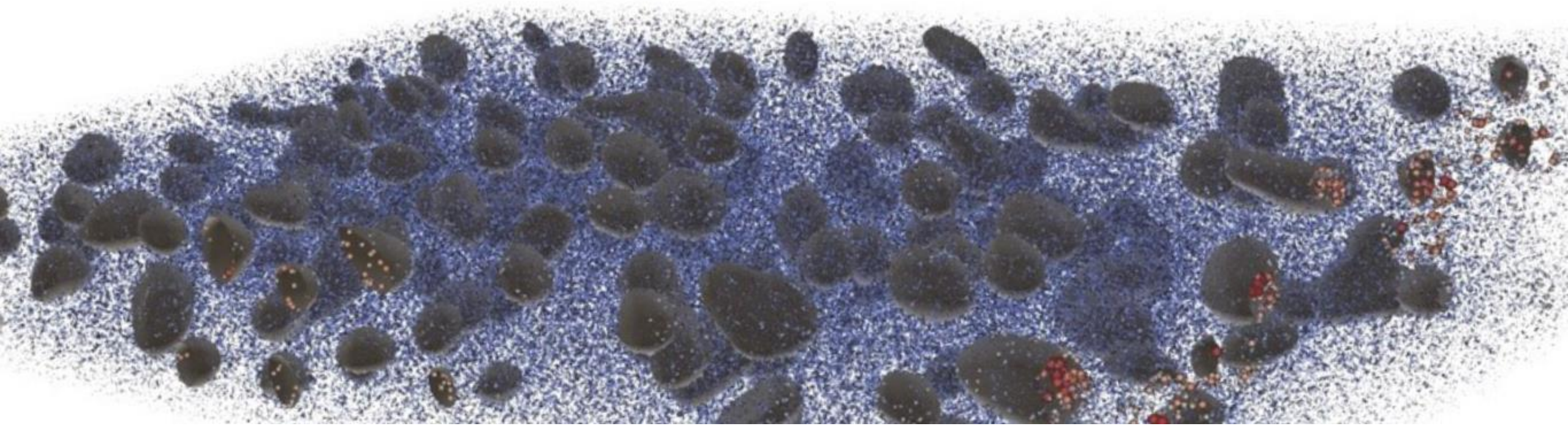


Simulation of particle-droplet interaction in turbulent three-phase flows

Work package 3

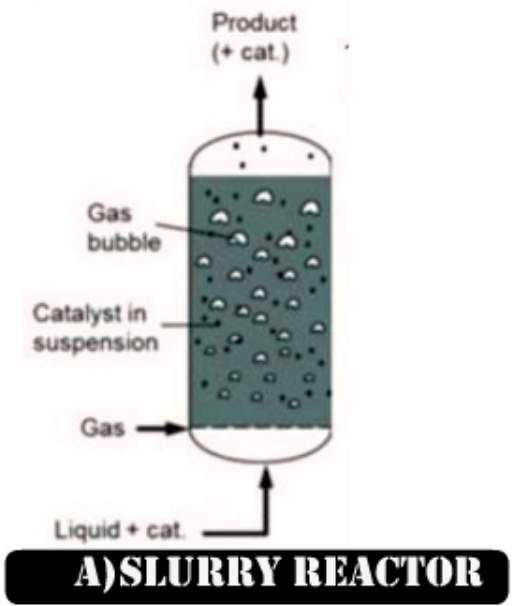
Phd Student: Kevin Miranda

Supervisor: Cristian Marchioli



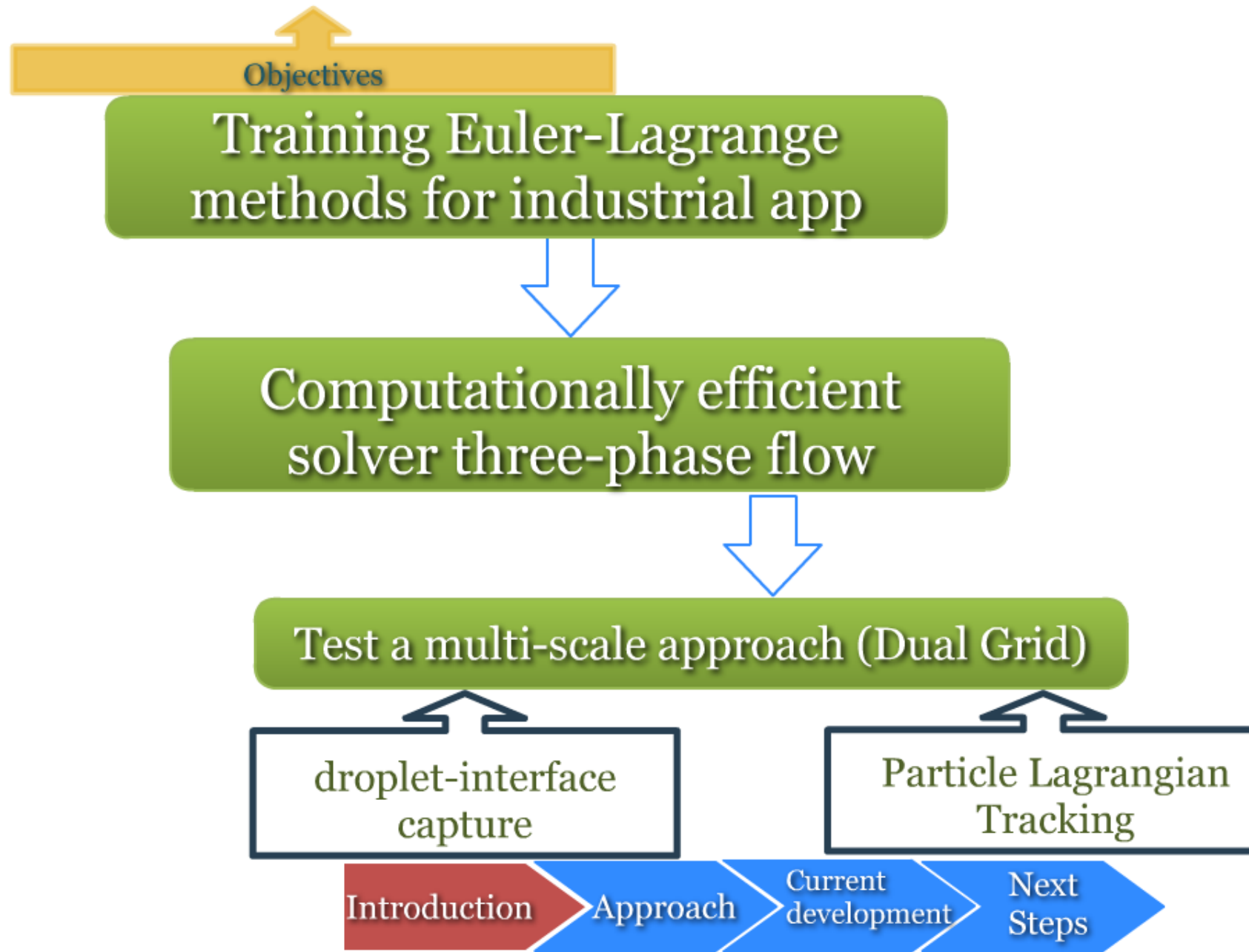
I) INTRODUCTION

Three-phase flows industrial applications

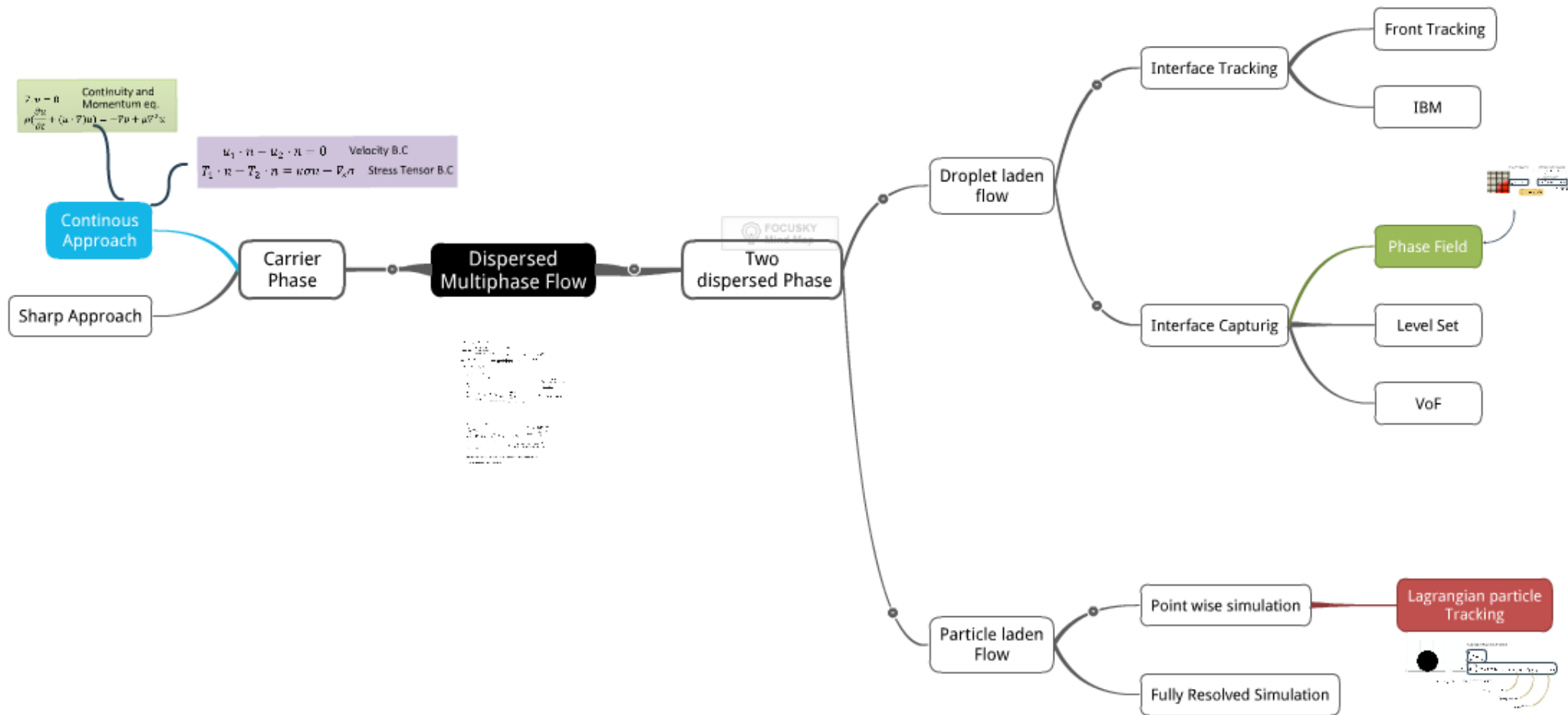


Jiulong Sun (Thesis 2014)





II) APPROACHES INVOLVED



III) CURRENT DEVELOPMENT

1

3D simulation
Settings

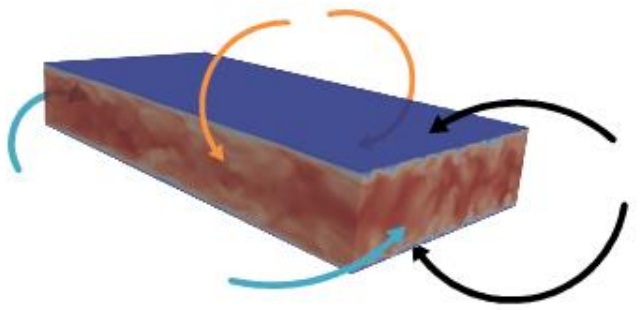
Simulation Parameter :

Grids= $512 * 256 * 257$ (N_x, N_y, N_z)
Size= $4\pi * 2\pi * 2(L_x, L_y, L_z)$

$Re_\tau = 150$
 $Pe = 50$
 $We = 0.5$
 $St = 1.5$

2

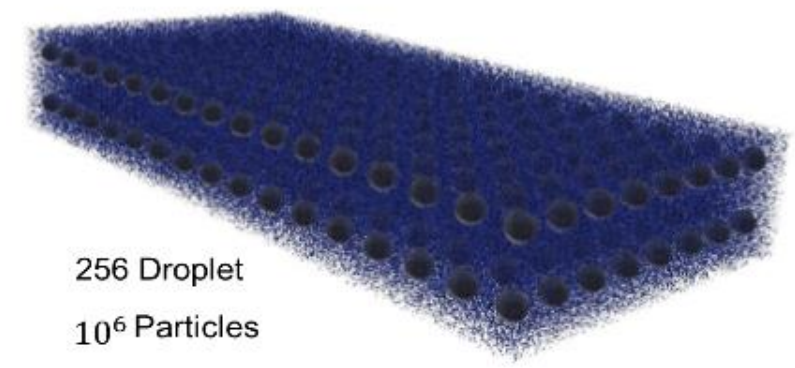
Boundary condition



3

Initialization

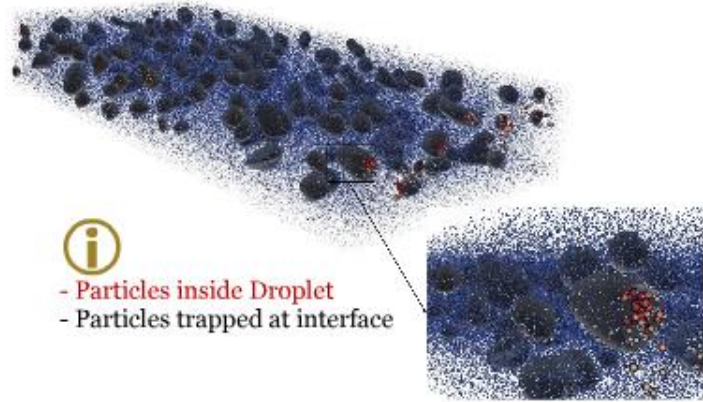
Fully Developed Turbulent Flow



256 Droplet
 10^6 Particles

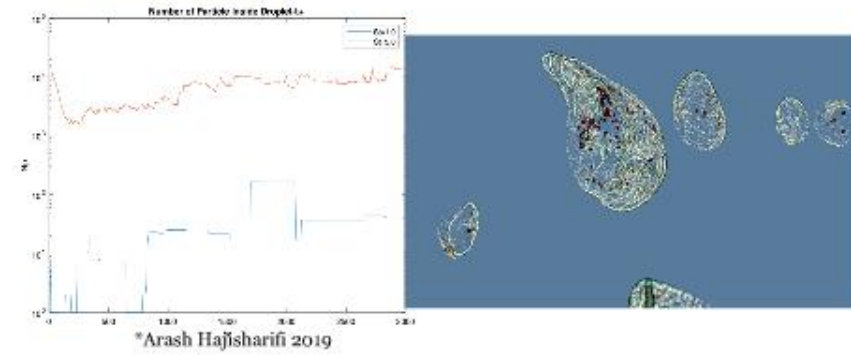
3D simulation
 Results

Domain Configuration at $t = 3000$

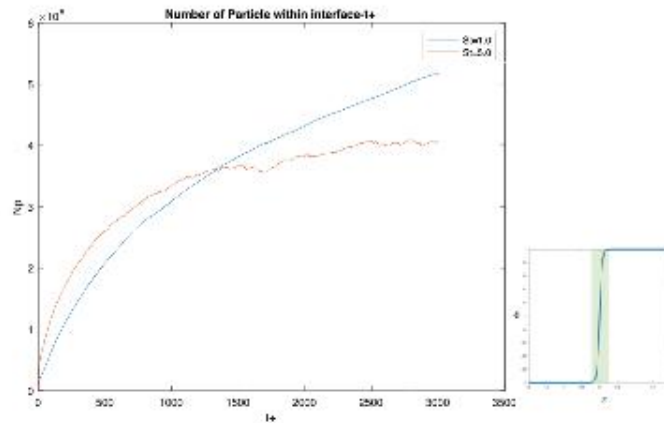


- Particles inside Droplet
- Particles trapped at interface

ii) Particles inside droplet

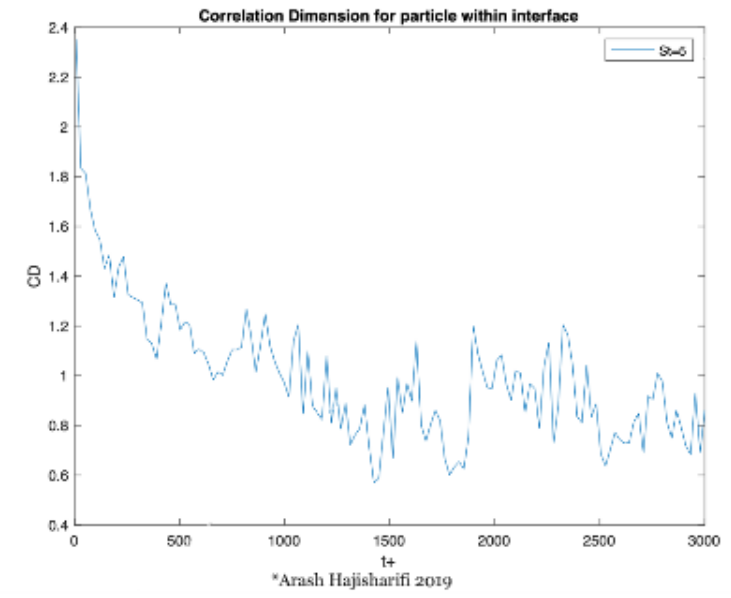
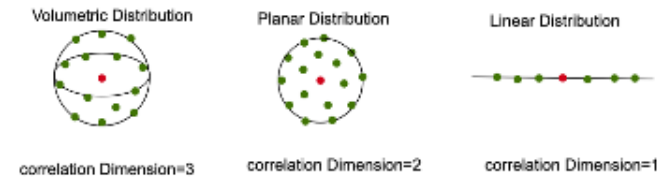
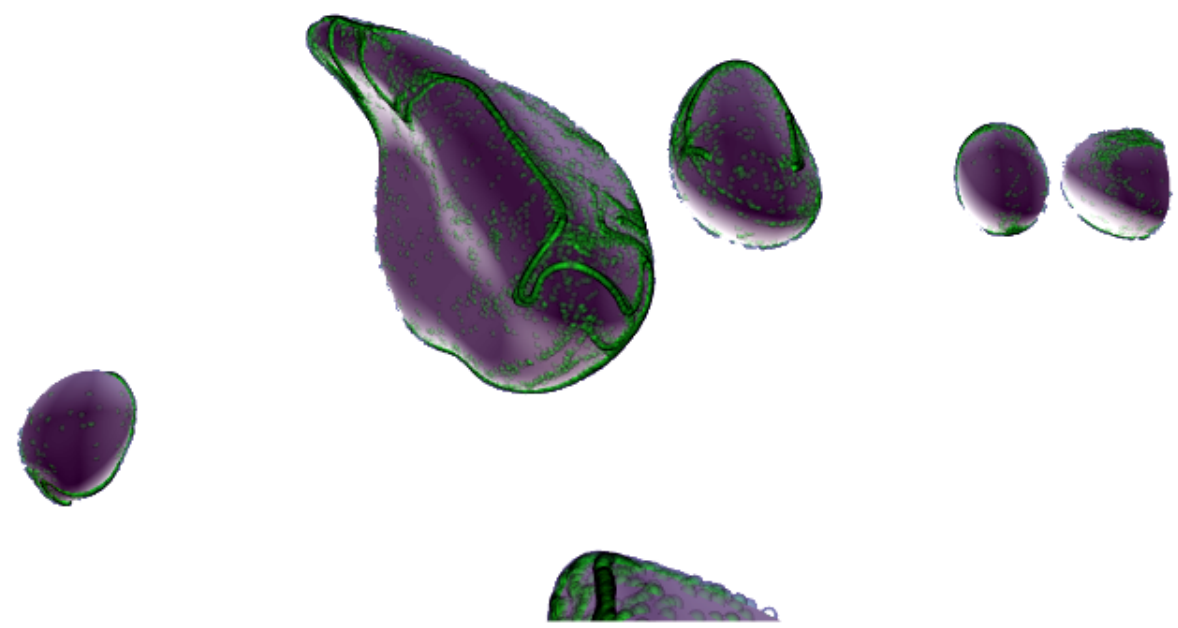


i) Particle Interface Interaction




3D simulation
Results

iii) Particles Distribution within interface

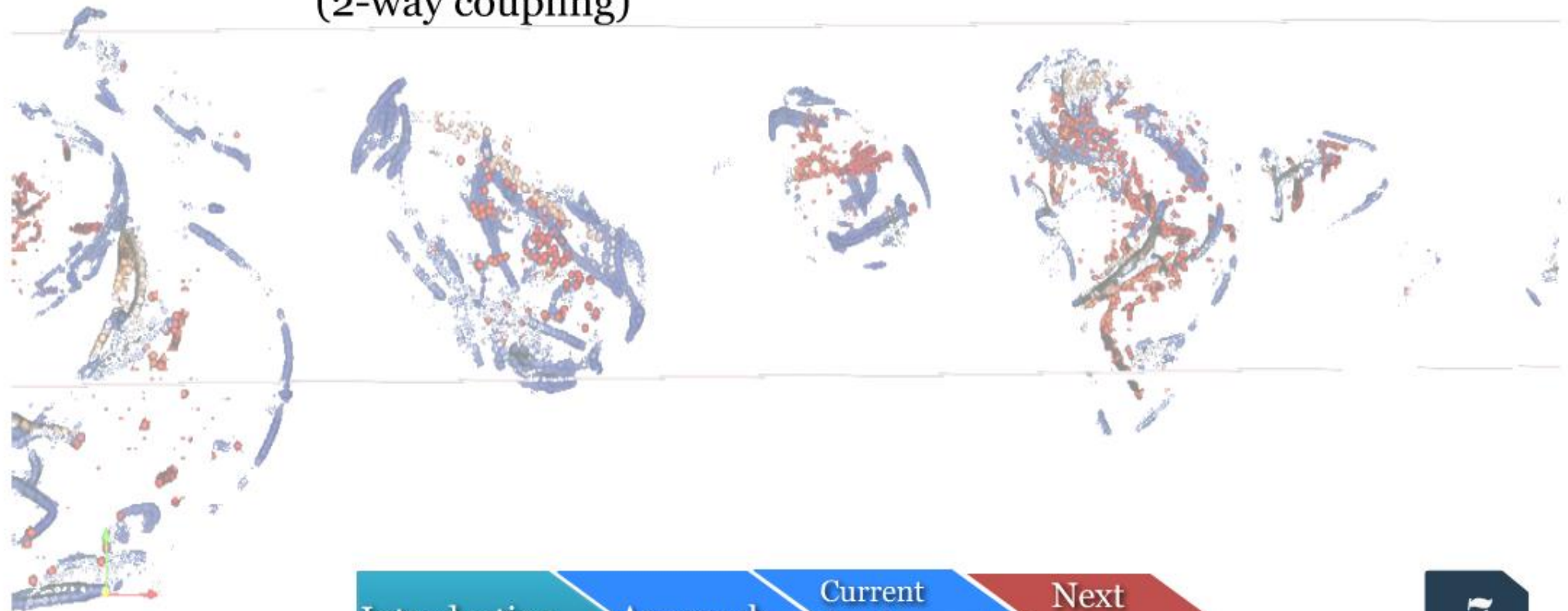


- Particles concentration increases with curvature
- Mean correlation around 1: Linear Distribution

IV) NEXT STEPS


Near Future Objectives

- Implementation Particle-Particle interaction model (collisions)
- Implementation of Particle feedback onto the Fluid (2-way coupling)





**THANKS FOR
YOUR
ATTENTION**