

Pharmaceutical
Multiphase Reactors
CHE.782

Design of Multiphase
Flow Processes
669.266

2

Usage of CPPPO library

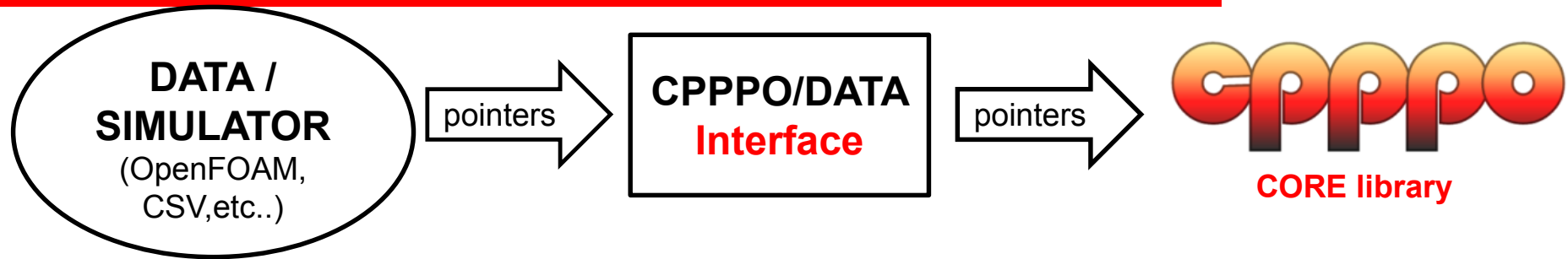
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A part of this teaching material has been
prepared for NanoSim (<http://sintef.no/NanoSim/>)



NanoSim - A Multi-scale Simulation-Based Design Platform

Usage CPPPO – How does it work?



CORE library

- Static library
- Contains all the classes and functions for data processing
- Contains the MPI implementation and communication schemes
- Manages the I/O
- Does **NOT** store data for new fields

Interface

- Shared object or stand-alone application
- Specific for the software (or data format) to interface with
- Collects pointers and hands them to the core library or reads the input data file
- Creates new fields when necessary



CPPPO package folder



applications

OpenFOAM and CFDDEM solvers already coupled with CPPPO



core

Source code for the main stand-alone CPPPO library



doc

Full documentation in markdown or pdf format



etc

«et cetera» folder containing useful scripts, bashrc and additionalLibs for CPPPO



examples

Simple applications of the CPPPO package covering all the available features



interface_CSV

Source code for the CSV interface and the stand-alone CPPPO-CSV



interface_OF

Source code for the CPPPO-OpenFOAM shared object

...go through the README.md!

<https://github.com/CFDEMproject/CFDEMcoupling-NanoSim-PUBLIC/blob/master/src/c3po/README.md>

📖 README.md



A Compilation of Fluid-Particle Post Processing routines.

CPPPO is part of the [NanoSim Project](#)

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- Copyright 2014 - Graz University of Technology (S. Radl, F. Municchi).
- Copyright 2014 - DCS Computing GmbH, Linz (C. Goniva, C. Kloss).

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...be sure your linux computer is set up, and you have all tools in place to access linux computers from Windows (on Windows, install Xming, putty & filezilla).

Linux resources:

- gedit
- git
- openmpi, (inkl. -devel)
- paraview (you can use the older OpenFOAM version, or the newest one provided by your distro or via <http://www.paraview.org/>)
- Matlab, octave, gnuplot

Windows resources (for accessing Linux machines and editing files):

- <http://sourceforge.net/projects/xming/>
- <http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html>
- <http://filezilla-project.org/>
- <http://notepad-plus-plus.org/>

...be sure OpenFOAM is installed (required for the OpenFOAM interface)

...be sure Qt 5.x and HDF5 (optional) is installed

- You can download CPPPO from the CFDEM GitHub repository typing :
`git clone https://github.com/CFDEMproject/CFDEMcoupling-NanoSim-PUBLIC`
- Carefully follow the instructions presented in **INSTALL.md**
- Check your additionalLibs (it is strongly recommended to copy etc/additionalLibs outside the c3po folder and edit it according to your system)
- Make sure all environment variables are correctly set in your **.bashrc** by running *etc/c3poSystemCheck.sh*
- In case of errors, please report using the forum at www.cfdem.com
- Check by running the examples using *etc/c3poRunTestCases.sh*

- All input/output is in the form of **text files**
- The **main input script** contains one command per line. It is similar to a Matlab input script, however, each command is NOT executed immediately.
- During a simulations, users **CANNOT directly interact** with CPPPO.


**initial conditions
for simulation
(depends on
simulator)**









**folder containing
CPPPO controls**

**auto-
postprocessing
scripts**

**other folders
(depend on
simulator)**

Branch: master ▾ [CFDEMcoupling-NanoSim-PUBLIC](#) / [src](#) / [c3po](#) / [examples](#) / [stokesFilter](#)

 cgoniva release on 2015-11-06_09-50-47

..	
 0.init	release on 2015-11-06_09-39-57
 0	release on 2015-11-06_09-39-57
 c3po_control	release on 2015-11-06_09-39-57
 constant	release on 2015-11-06_09-39-57
 octave	release on 2015-11-06_09-39-57
 system	release on 2015-11-06_09-39-57
 Allclean	release on 2015-11-06_09-39-57
 Allrun.sh	release on 2015-11-06_09-50-47
 run.sh	release on 2015-11-06_09-39-57

Link the CPPPO-OpenFOAM library and **modify the solver**

```
84  
85 #include "c3po_OF_interface.H"  
86 #include "argList.H"  
87 #include "fvMesh.H"
```

Include the CPPPO-OpenFOAM interface in your solver

```
using namespace Foam;  
using namespace C3PO_NS;
```

Use the **CPPPO namespace**

Create the c3poOFInterface object

```
//Create C3PO  
c3poOFInterface *myC3PO= new c3poOFInterface(mesh_, MPI_COMM_WORLD);  
myC3PO->checkMyMesh();
```

Let CPPPO check your mesh

Run

```
myC3PO->run();
```

Delete

```
MPI_Barrier(MPI_COMM_WORLD);  
delete myC3PO;  
Pout << "End of application." << endl;
```


Impressum & Disclaimer

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