

Pharmaceutical
Multiphase Reactors
CHE.782

Design of Multiphase
Flow Processes
669.266

1 *Overview of the CPPPO library*

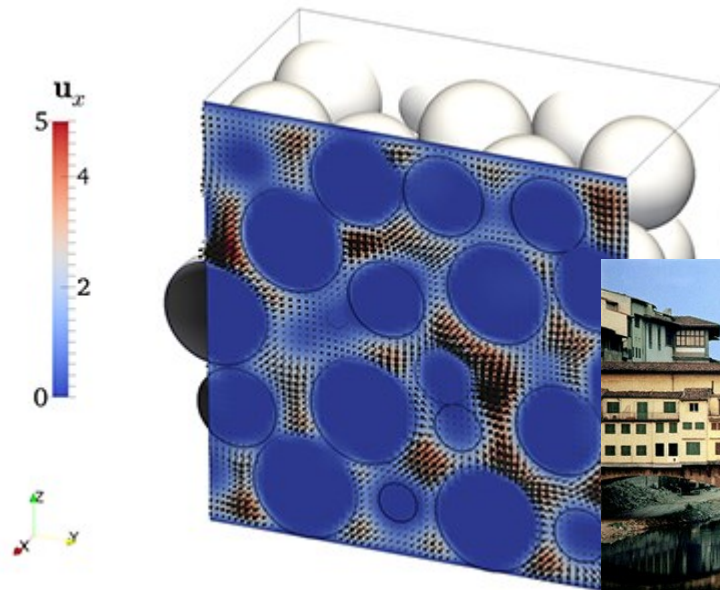
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Institute of Process and
Particle Engineering
Inffeldgasse 13/III
TU Graz

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

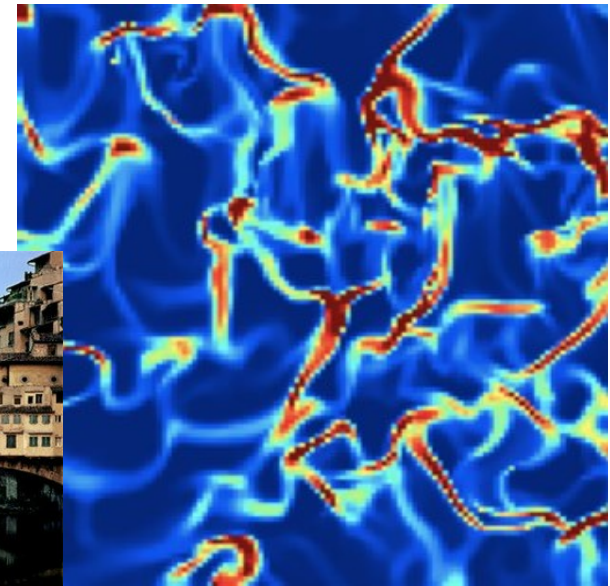


NanoSim - A Multi-scale Simulation-Based Design Platform

- CPPPO is a C++ library of **parallel** data processing functions.
- It is a tool for “**offline scale bridging**”, i.e., developing closures for coarse mesh models by **filtering** fine mesh data.

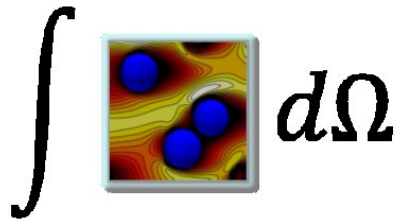


Ponte Vecchio, Florence

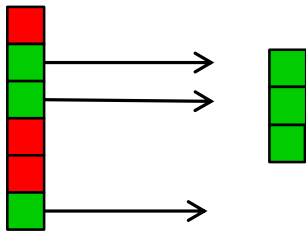


W. Holloway, PhD Thesis, 2012.

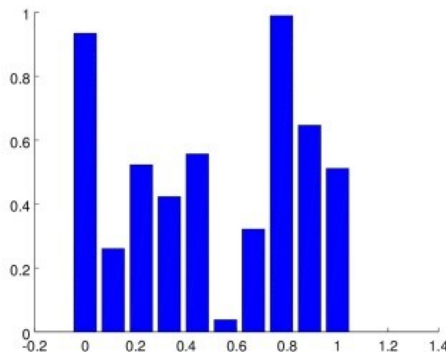
A typical CPPPO run consists of **three sets of operation** performed **on the fly** (i.e., while the solver is running).



Filtering of fluid and particle data, including **variance calculation**



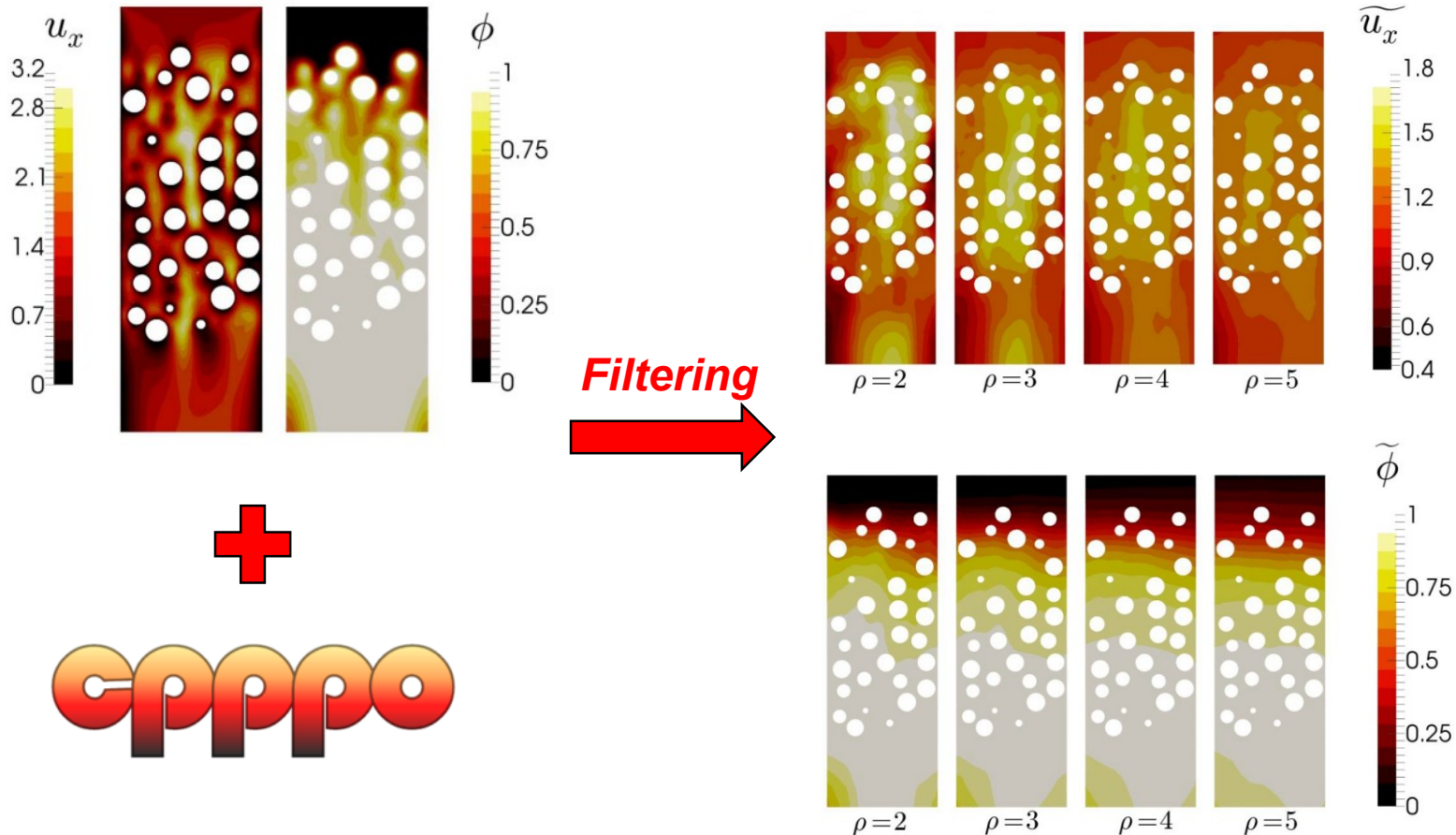
Sampling of filtered data and their derivatives with **statistical biasing** (e.g. limiters)



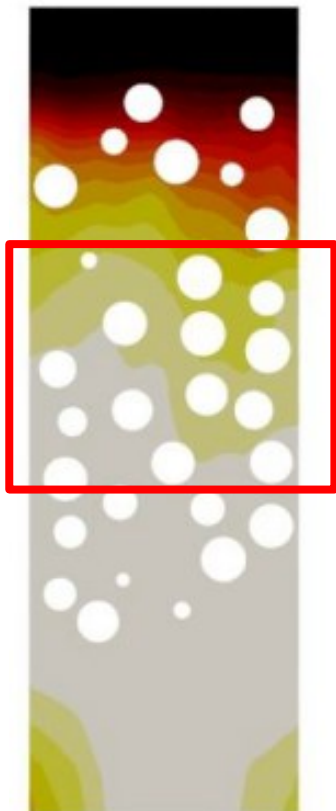
Binning of sampled data using **running statistics**

Overview CPPPO – DNS filtering

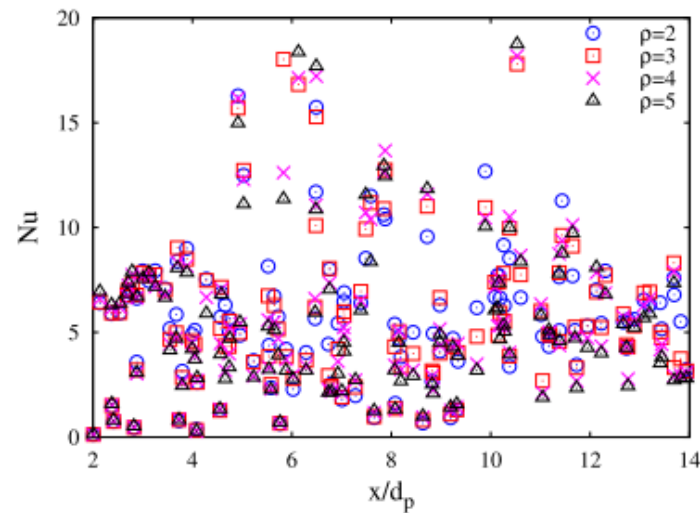
$\int \text{[Image]} d\Omega$: **Parallel filtering applied to *resolved* simulations**
Using simulation results from OpenFOAM

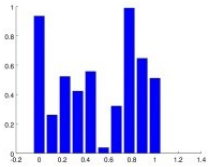


- 
- Parallel data sampling
• Using data from filtering operations

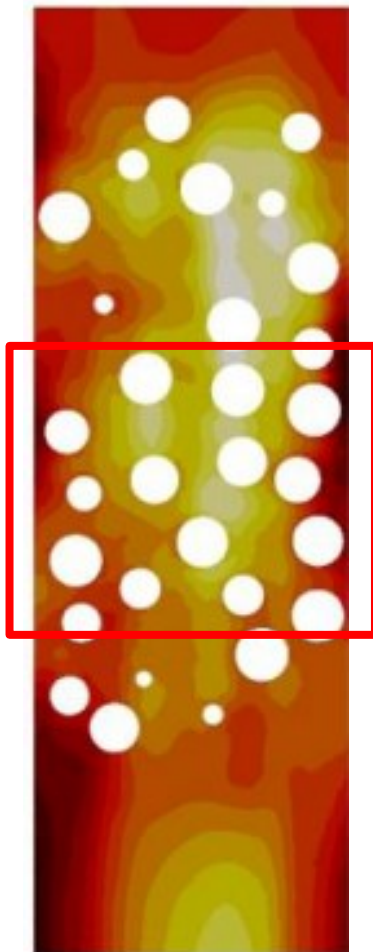


Sampling

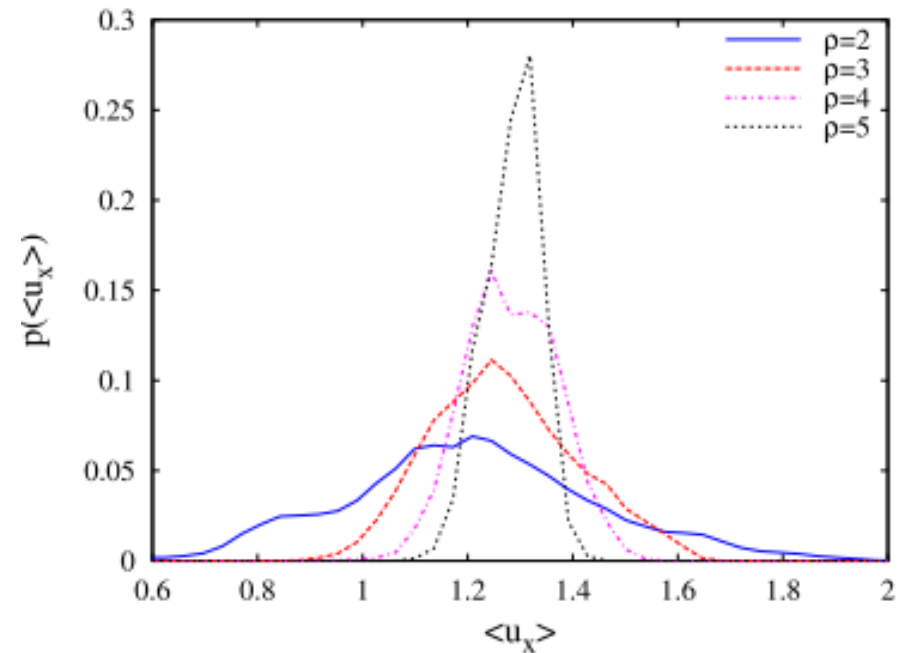




- Parallel data binning
- Using data from sampling operations



Sampling + binning



- For a full feature list and the most recent updates
<https://github.com/CFDEMproject/CFDEMcoupling-NanoSim-PUBLIC/blob/master/src/c3po/RELEASENOTES.md>



A Compilation of Fluid-Particle Post Processing routines.

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

Graz University of Technology and DCS Computing GmbH release CPPPO

31st of Decemmbber 2014

The Graz University of Technology (TU Graz) together with DCS Computing GmbH (DCS) are please to announced the release of the 1.0.1-beta version of the tool CPPPO . This version is distributed is licensed under the [Lesser General Public License](#) by TU Graz and DCS.

Features

Version 1.0.1-beta is the first public release of the CPPPO library and is meant to introduce its features to a wide audience of users and possible developers of this library. Specifically, the current version of CPPPO is able to

- compute a filtered (i.e., spatially-averaged) fluid velocity field during an OpenFOAM simulation run (i.e., "on the fly") and in parallel.
- read CSV data files (e.g., as dumped from ANSYS FLUENT) and perform filtering operations
- draw different types of samples (e.g., local fluid velocity, or two-point velocity correlations)
- each sample can be characterized with a number of markers

Impressum & Disclaimer

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