14th World Congress on Computational Mechanics (WCCM XIV)
8th European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS 2020)
July 19- 24, 2020, Paris, France

ADVANCED EULER-LAGRANGE TECHNIQUES FOR COMPUTATIONAL MULTI-PHYSICS/SCALE RESOLUTION

TRACK NUMBER 300

XAVIER BESSERON*, BERNHARD PETERS , ALVARO ESTUPINAN DONOSO AND ALBAN ROUSSET

* Université du Luxembourg. 6, avenue de la Fonte, L-4364, Luxembourg
xavier.besseron@uni.lu, http://luxdem.uni.lu

Key words: Extended Discrete Element Method (XDEM), HPC, CFD, DEM, Multi-Physics Coupling

ABSTRACT

A multitude of engineering applications and physical problems are complex in nature and include a number of separate physical processes that all contribute to the entire application on usually different length and time scales. These applications are as diverse as engineering, astrophysics, material science e.g. additive manufacturing, biology, energy e.g. biomass, environmental science, thermal processing and pharmaceutical industry to name a few [1]. In order to understand the interaction between different physical processes, researchers combine existing models to represent multi-physics/scale applications. Within this mini-symposium, we address a particular class of multi-physics problems, that include a discrete phase as a particulate material that is in contact with a fluid phase [2]. A major challenge lies in coupling the granular material through heat, mass and momentum exchange to the fluid phase, sometimes a reacting multi-phase flow, so that the overall model is accurate enough and can be executed efficiently on modern computing resources including high performance computing (HPC). Thus, we welcome contributions covering but not exclusively the following areas:

- Multi-physics/scale coupling techniques
- Industrial applications and requirements
- Generic interface constructions
- Parallelisation and high performance computing

REFERENCES

[1] D. Groen, S.J. Zasada, and P.V. Coveney, "Survey of Multiscale and Multiphysics Applications and Communities", *Computing in Science Engineering*, Vol. **16:2**, pp. 34-43, (2014).

[2] B. Peters, M. Baniasadi, M. Baniasadi, X. Besseron, A Estupinan Donoso, M. Mohseni, G. Pozzetti, DEM multi-physics and multi-scale simulation technology: Review of DEM-CFD coupling, methodology and engineering applications, Particuology, 2018