Graphical User Interface for Multi-Physics Simulations of Particulate Matter – PARTICLES 2017

Florian Hoffmann*, Frank Vogel*

* inuTech GmbH
Fuerther Str. 212
90429 Nuremberg, Germany
e-mail: florian.hoffmann@inutech.de, web page: http://www.inutech.de/

ABSTRACT

Numerical modelling of particulate matter has gained much popularity in recent decades. Advanced Multi-physics Simulation Technology (AMST) is a state-of-the-art three dimensional numerical modelling technique combining the eXtended Discrete Element Method (XDEM) with Computational Fluid Dynamics (CFD) and Finite Element Analysis (FEA) [1]. AMST allows to gain insight into industrial thermochemical reactors for which direct measurement is usually not practical. Furthermore, the simulation technology can be used to shed light into the complex and highly coupled phenomena occurring during thermal conversion of particulate matter [2, 3].

In order to ease the user experience when working with AMST a graphical user interface (GUI) was developed. This contribution highlights the concept and features of a very modular graphical user interface for AMST predictions. As a key feature the software allows the user to configure a multi-physics model for AMST and thus fully covers the pre-processing stage. Thus, it eases the user experience by allowing the user to investigate available options offered by the simulation software and providing explanation about all available options and settings. Furthermore, the user can generate complex initial conditions such as initial particle configurations by geometrical packing algorithms or generate distributions for all initial conditions for the involved mechanical and thermochemical processes. These initial conditions can be easily manipulated by mathematical functions and user-defined expressions, or may be imported from text files or previously run simulations. In order to allow the user to visually inspect the case setup visualization of initial conditions is available through ParaView.

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