

## Modelling of granular matter behaviour in an external temperature field using an advanced CFD-DEM method

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This work presents the results of numerical simulations of the heating process in a packed bed of solid particles. For this purpose, an advanced model that couples the Eulerian-Lagrangian approach (CFD-DEM) known as the XDEM method [1] was employed. It was assumed that heat exchange with the surroundings influences the particles' structure, as a consequence of chemical reactions acting inside and on their surfaces. Due to changes in the mass and shape of the particles, the bed shrinks, and the particles displace. The calculations account for particle collisions, and their translational and rotational motion, as well as changes in the material properties within each particle. Practical applications of using the XDEM software are presented. These relate to predicting the behaviour of solid fuel beds in reactors or burners. The various operating conditions of such devices, as well as the different sizes and shapes of the bulk material particles, are taken into account. The results are then compared with experimental data [2, 3].

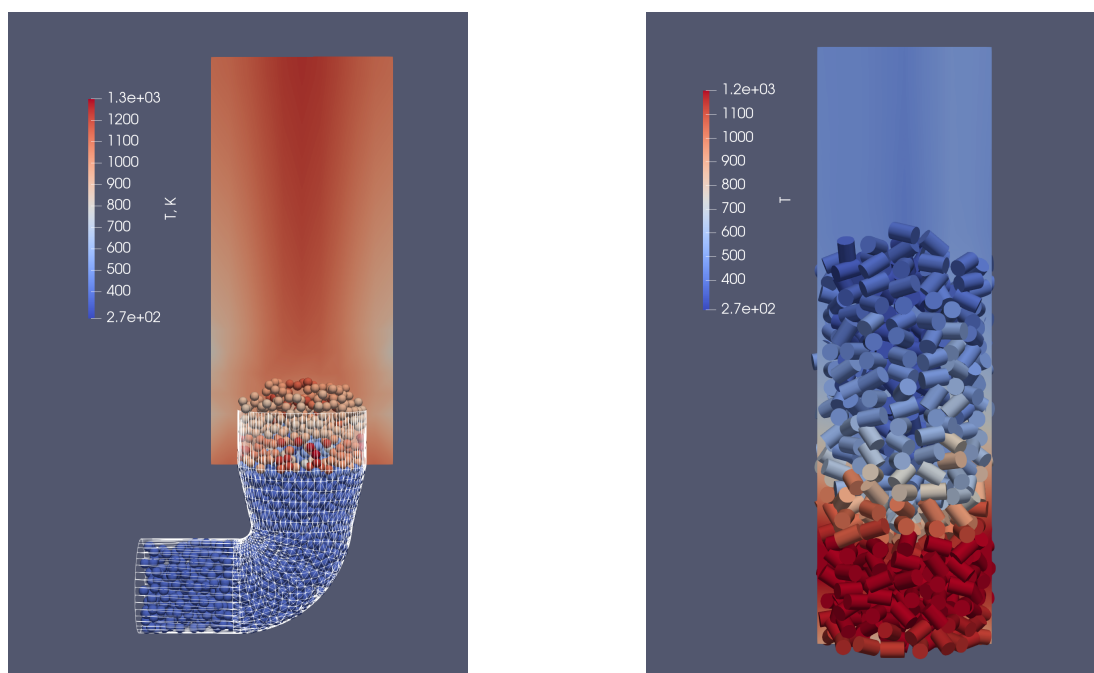


Figure 1. Temperature distribution in biomass burner (left) and thermal conversion reactor (right).

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