10.2 **DEM-CFD Coupled Simulation of Oil Shale Pyrolysis in a Rotary Kiln**

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Numerical simulation is increasingly applied in various fields as a cost-effective and time-saving alternative approach. The simulation for oil shale or oil sands retort system, such as a horizontal rotary kiln, is mostly based on computational fluid dynamics (CFD) methods. However for oil shale in a rotary kiln, the collisions among solid particles and those between particles and kiln inner wall play a big role in the pyrolysis process. In this work a discrete element method (DEM) is employed. The collision, spreading, transporting, and mixing of oil shale in a kiln are obtained. DEM is further coupled with CFD to calculate the heat transfer processes. The results reveal that this DEM-CFD coupling method is able to simulate dynamic details of oil shale particles in a rotary kiln very well.