DISCRETE ELEMENT MODELLING OF LIQUID TRANSFER BETWEEN PARTICLES

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ABSTRACT

Liquid transfer within granular materials can result in alteration of the physical properties of the material due to the formation of liquid bridges between individual particles. Cohesive and viscous forces lead to complex and still not well understood granular behaviour. This can have a significant impact on various industrial processes such as coating, drying or granulation. Understanding how liquid is transferred in the micro scale between individual particles has been very challenging both experimentally and computationally [1].

Here, we employ the Discrete Element Method in order to implement a liquid transfer model between particles. We use a GPU based in-house code called XPS (eXtended Particle System*)*, developed at Research Center Pharmaceutical Engineering, in Graz of Austria. The liquid transfer model is following the steps below :

1) wet particles collide and a liquid bridge is formed.

2) the cohesive forces between the particles are calculated, according to the volume of the liquid bridge formed between them.

3) the particles are separated and the distance at which the liquid bridge is breaking is calculated.

4) redistribution of the liquid at each particle, is taking place.

The objective of this work is to review and optimise existing models on liquid transfer, with the goal to better understand and improve major industrial processes.

REFERENCES

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