Mathematical Modelling of Particle Vibrating in a Box

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Background

Resonant Acoustic Mixing (RAM) is a novel type of mixing technology and this paper looks into simulating a powder mixing condition within a RAM vessel.

Objectives

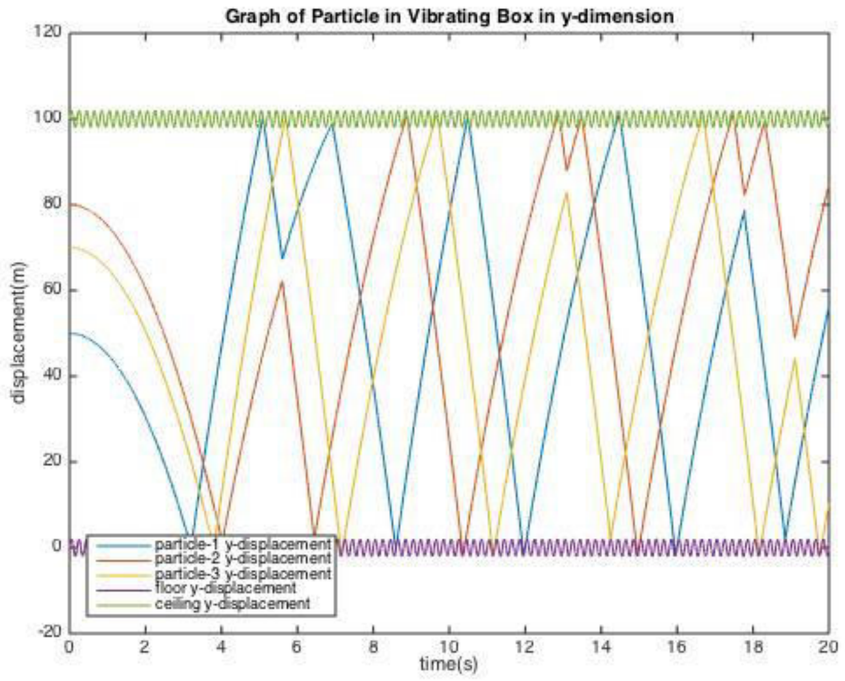
- Develop a mathematical model of particle vibrating in a box using MATLAB
- Investigate effect of various process parameters on mixing quality

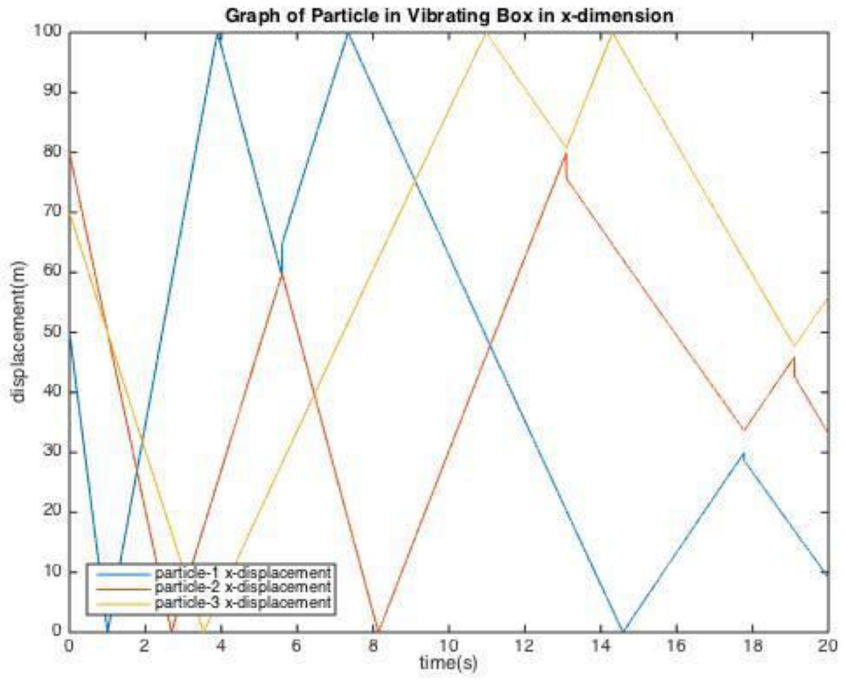
Model Development

- Particle displacement by means of inter-particle and particle-wall collisions
- Losses due to drag and collision inelasticity

Results

- Particle speed independent of particle count
- Possible existence of vessel acceleration threshold in order for particles to vibrate at same speed as vessel walls
- Inelastic wall materials and viscous medium slow down particles





Conclusion

- Develop further understanding of collision dynamics during RAM powder mixing
- Mathematical model as possible tool in optimising mixing process