

A new simple model for the determination of the pore constriction size distribution

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Motivation

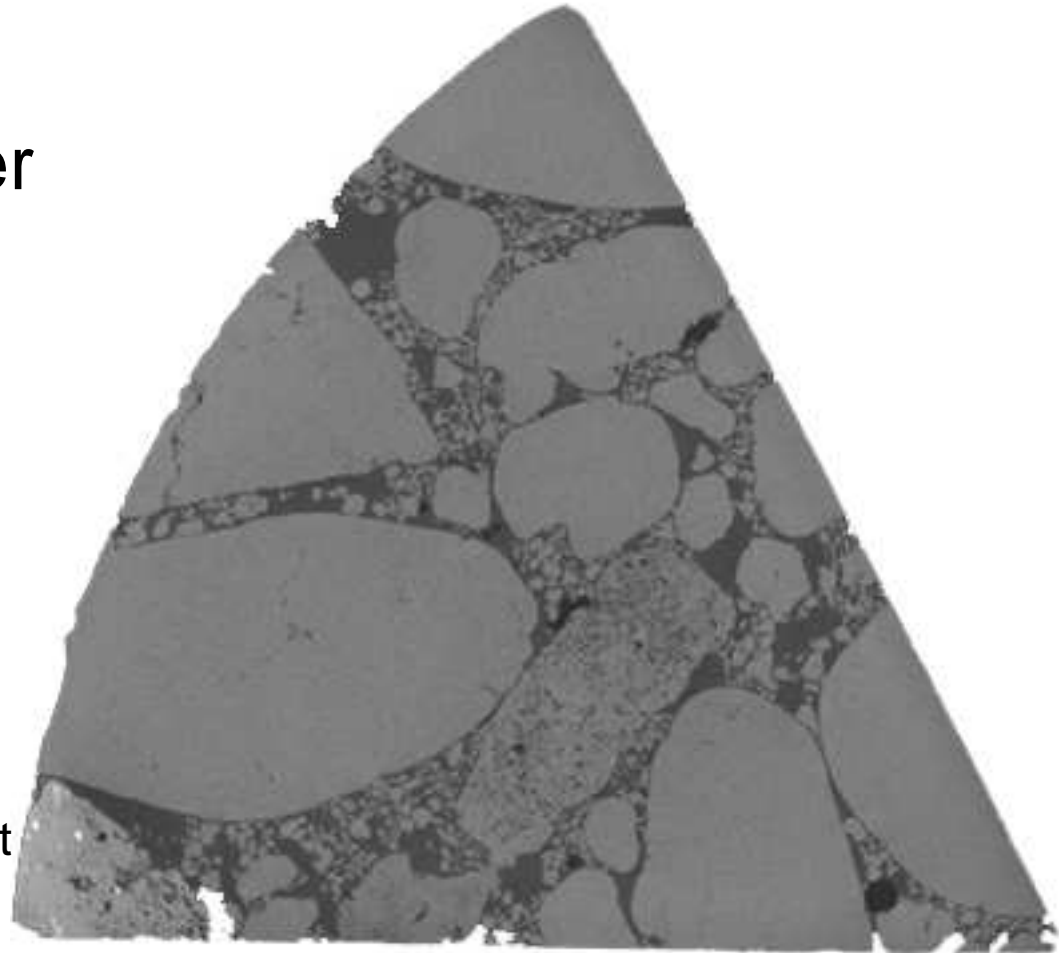
- Dam safety



Blackman Creek Dam 10/2005
Source: <http://soer.justice.tas.gov.au>

Difficulties in soil structure modelling

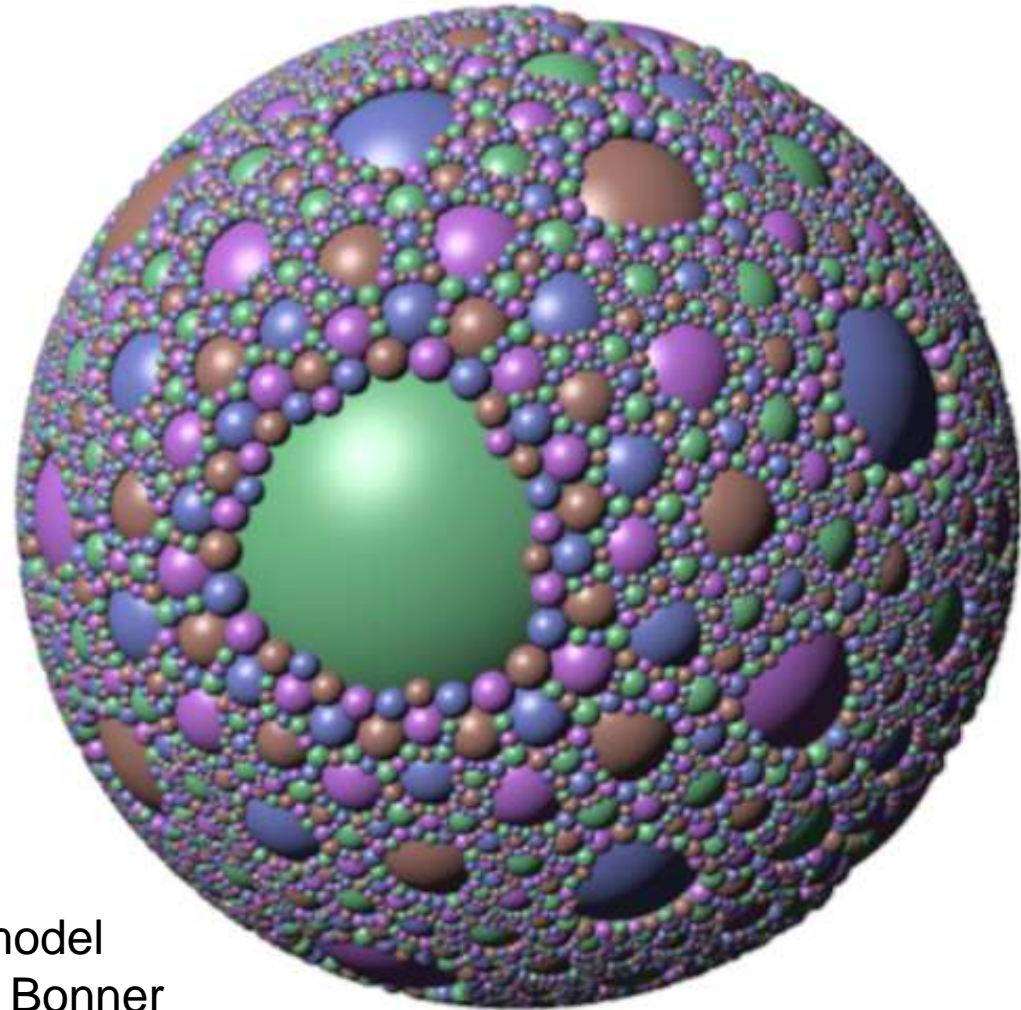
- Discrete environment
- Enormous number
- Complex shape



Artificial soil cut
Binner, 2010

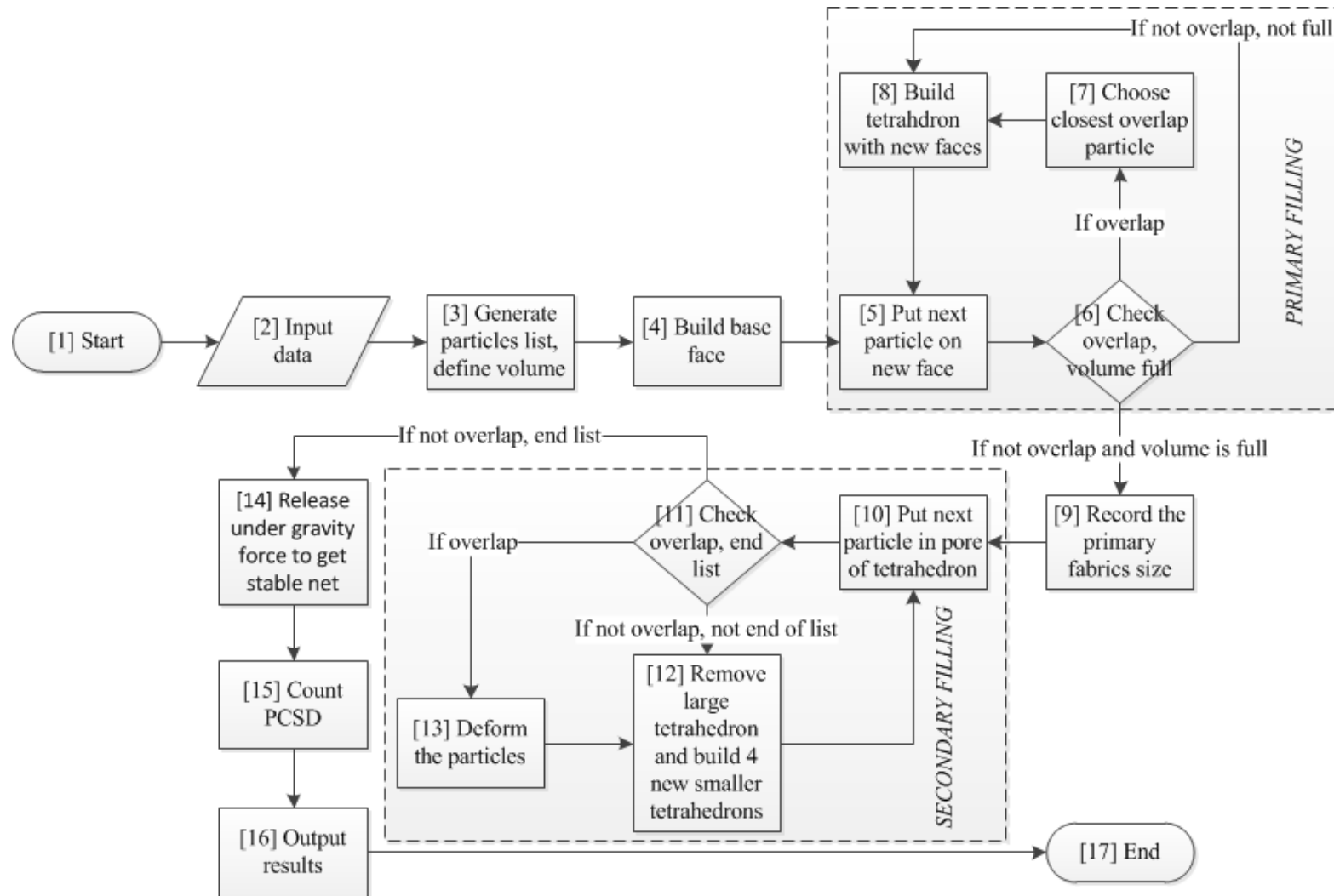
Why sphere packing ?

- Quick
- Acceptable

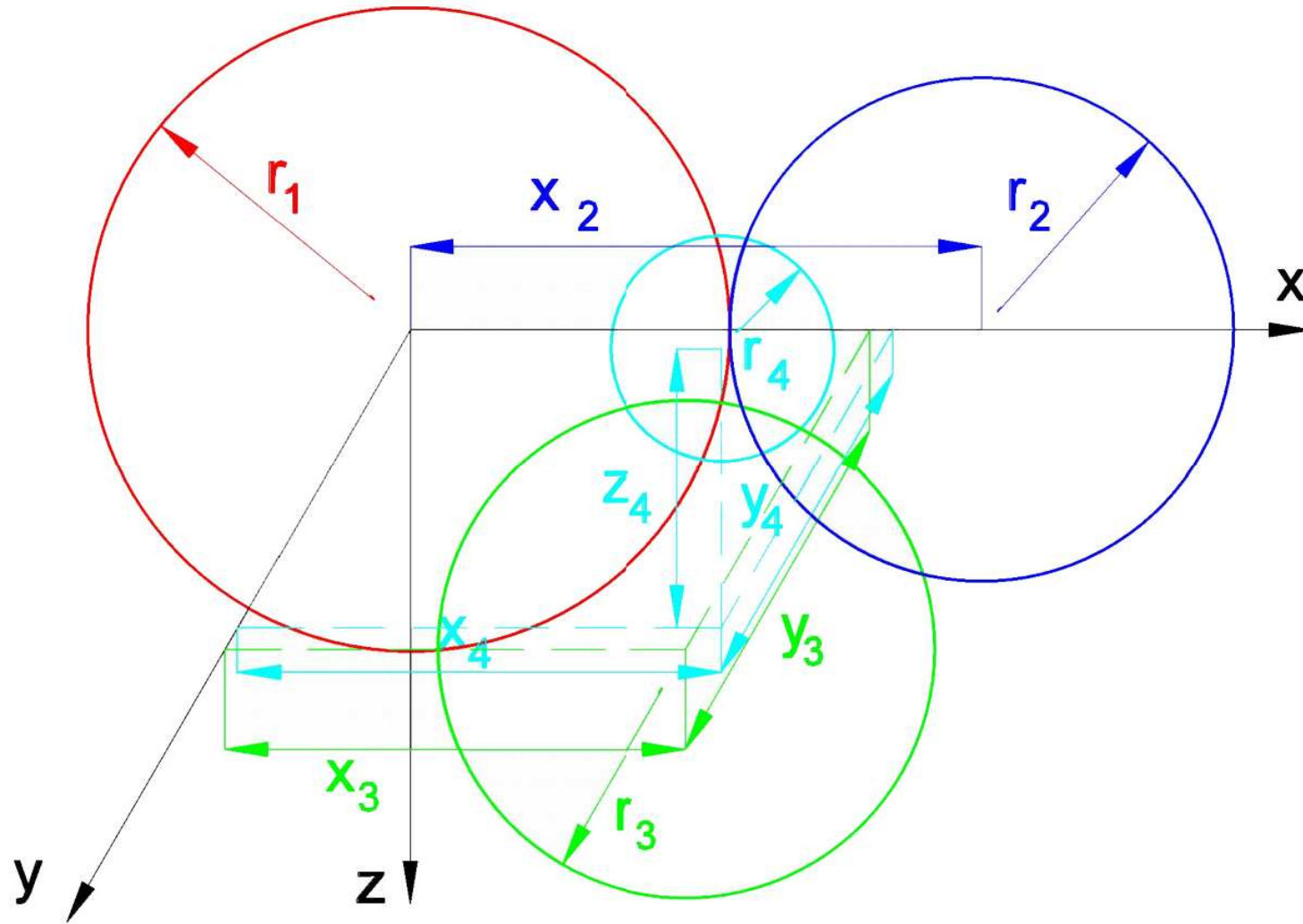


Apollonian fractal model
Copyright: Thomas Bonner

The new algorithm

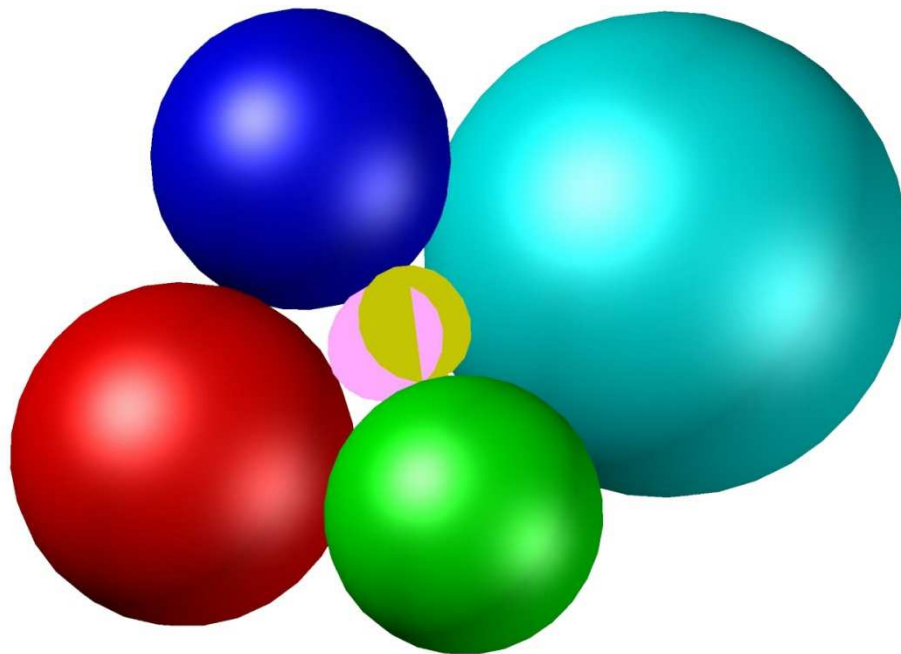


Local system coordinates

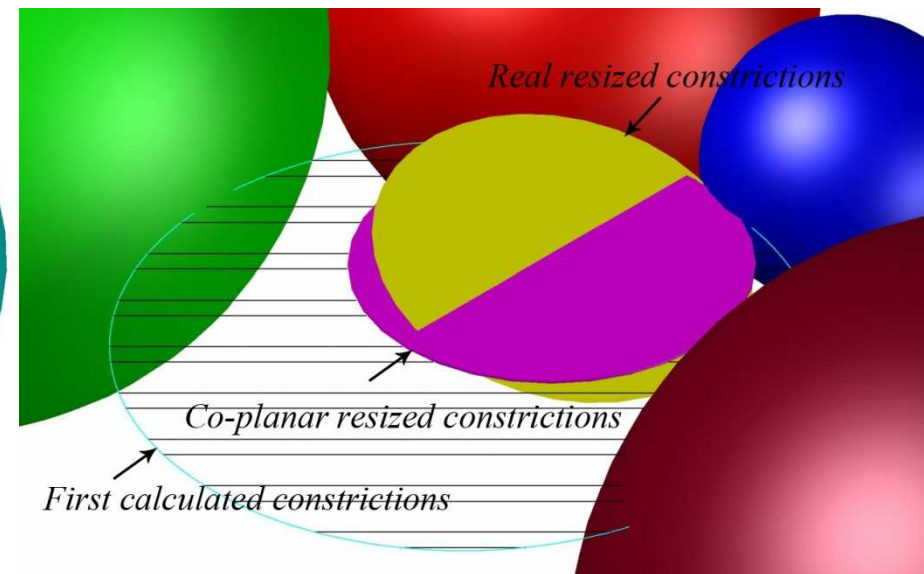


Constriction calculation

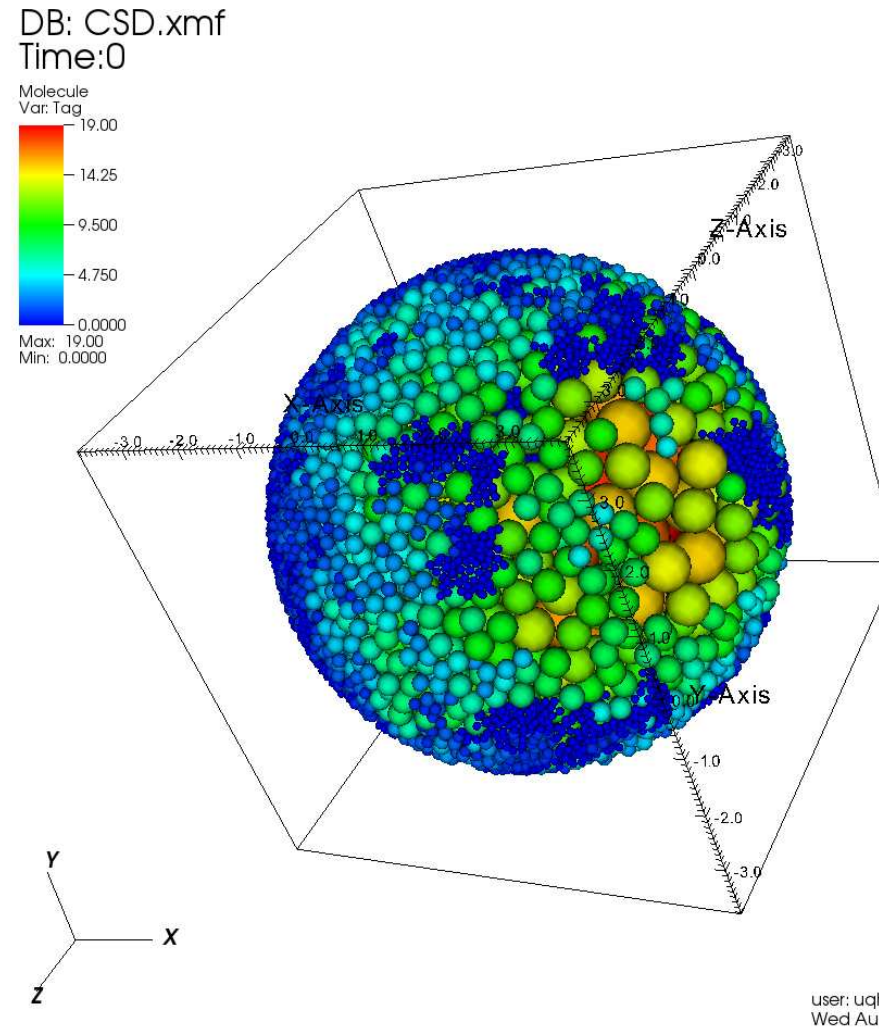
- No four edges constriction



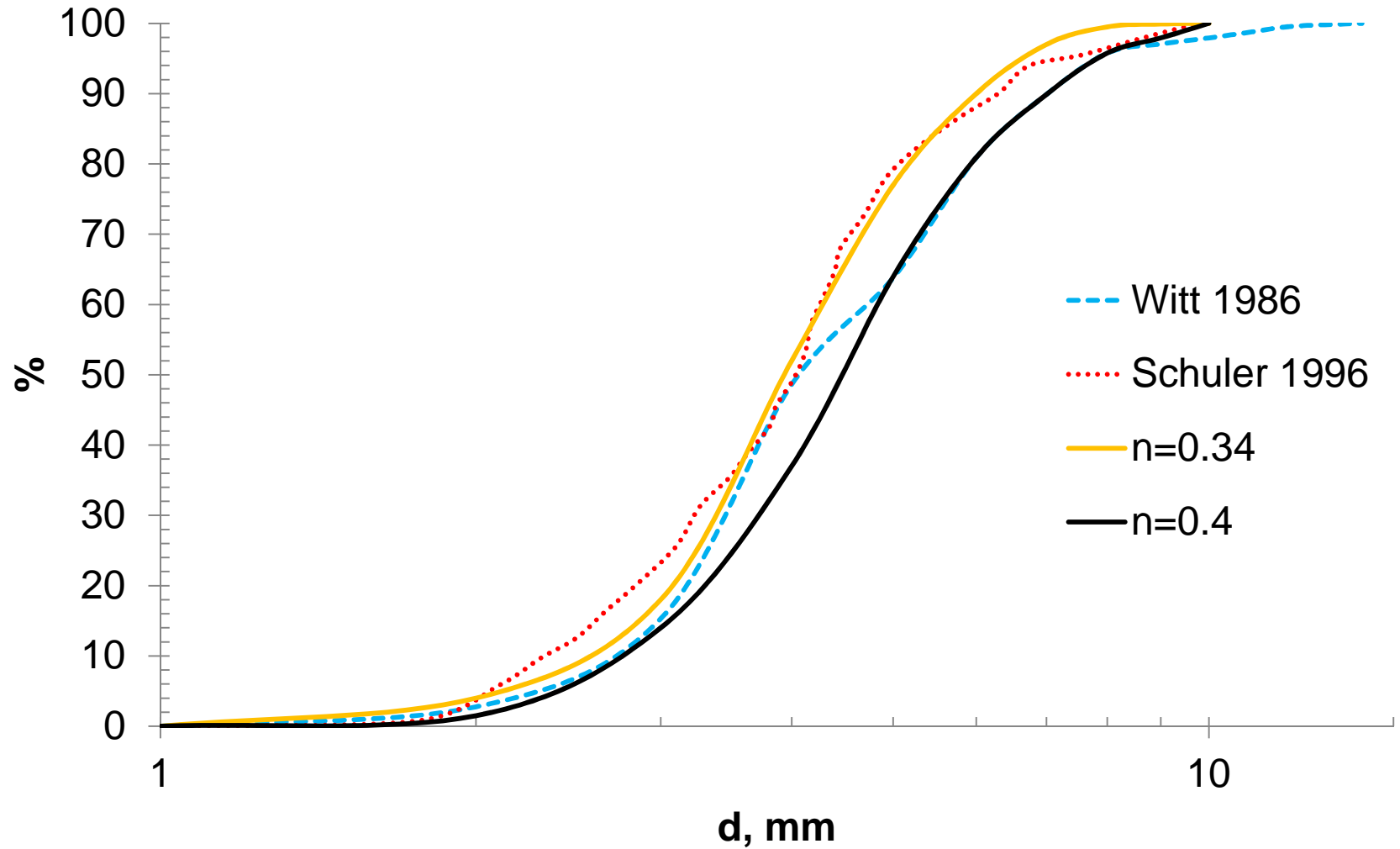
- Real constriction sizes



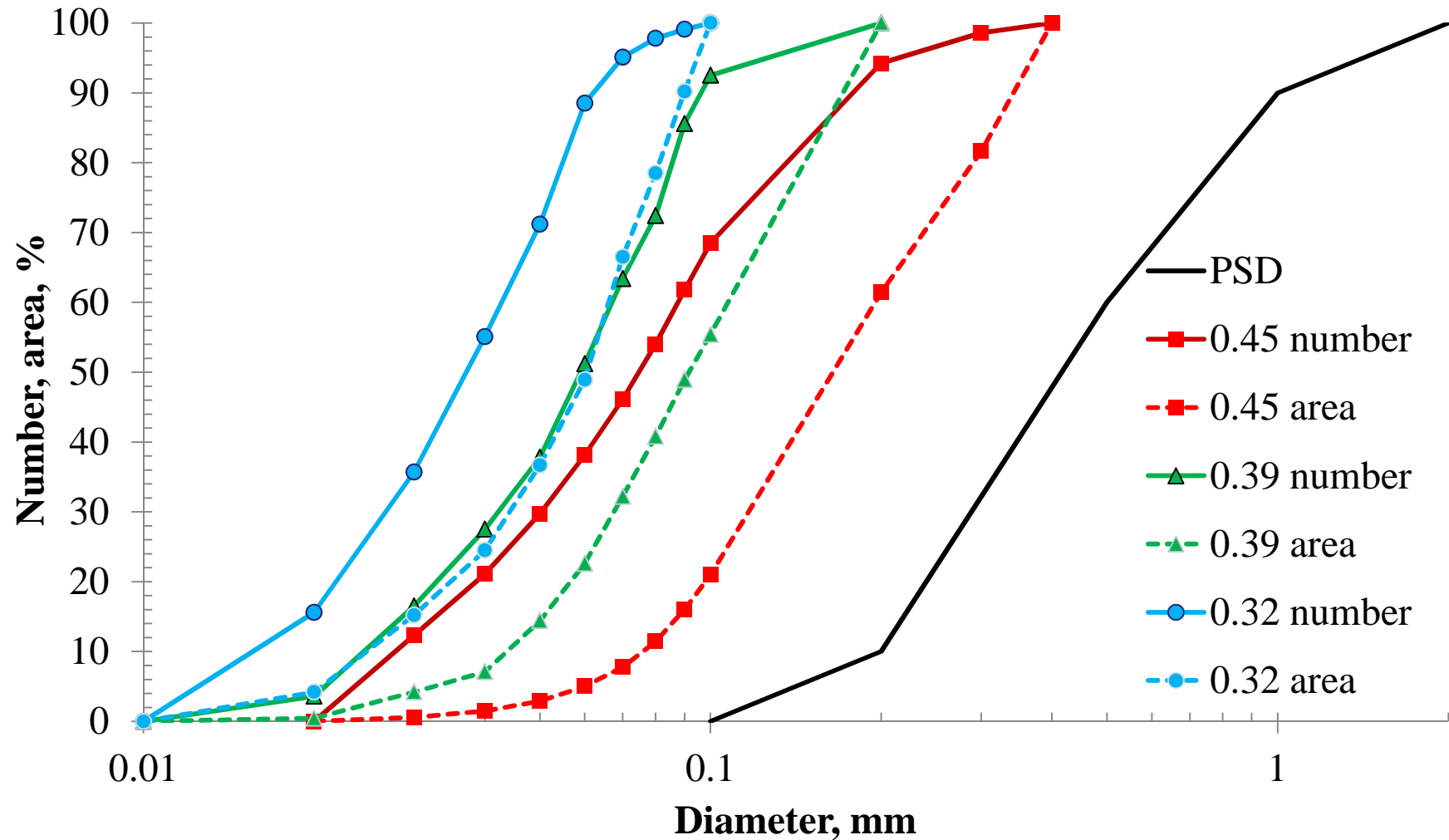
Visualisation of results



Result analysis – Experiment match



Results analysis – Porosity influence

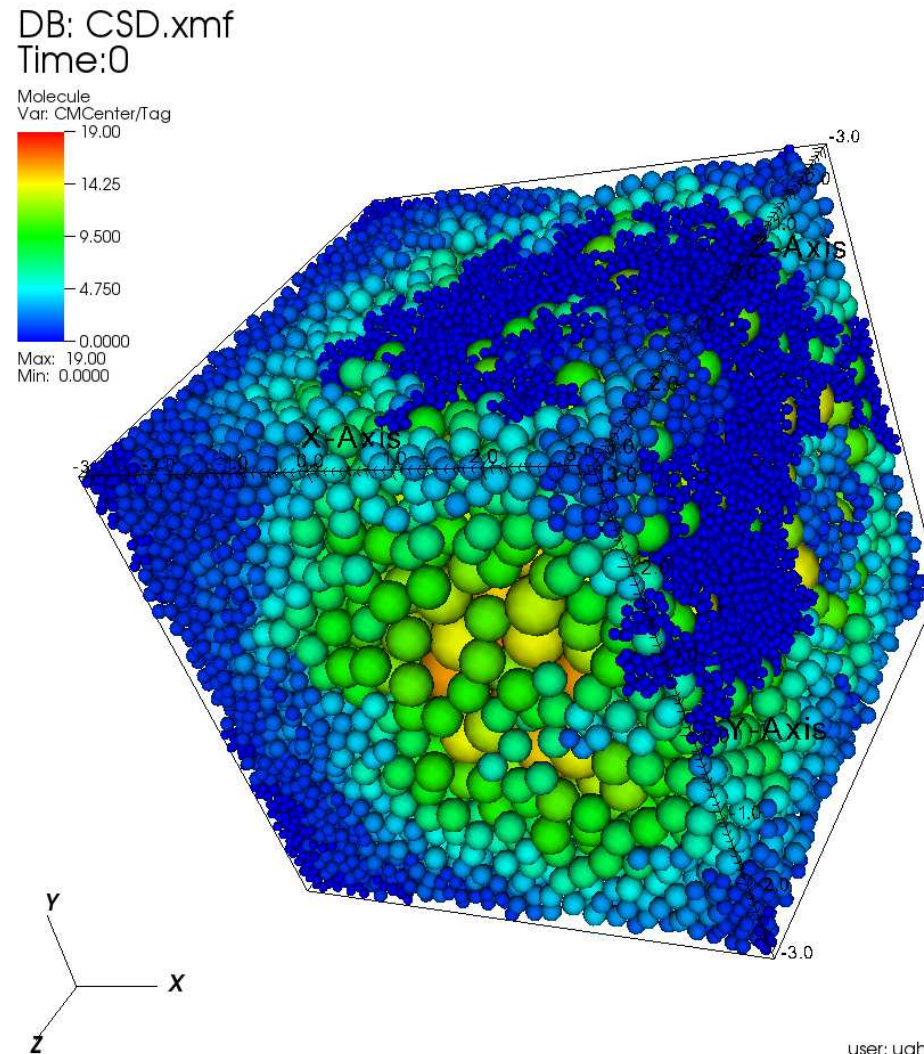


Summarize

- ✓ Model
- ✓ CSD calculation
- ✓ Porosity influence
- ✓ Quick & reliable
- ✓ Wide range of PSD and porosity
- ✓ Position control
- × Small specimen
- × Simple shape

DEM, LBM further study

- Arrangement
- Moving process



Acknowledgement

- Discovery Project (DP120102188)
- Go8 / DAAD
- ACARP project C19022

References

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THANK YOU FOR YOUR ATTENTION