

DEM9



Detailed Programme

Duration:

Plenary talks: 35 mins + 10 mins discussion

Contributed talks: 20 mins + 5 mins discussion

Mini-symposium talks: duration up to the organisers

September 17, 2023 (Day 0- Sunday)

18:30-21:00 **Welcome reception & registration**

September 18, 2023 (Day 1- Monday)

08:00- **Registration**
09:00

09:00- **Opening**
09:10 **remarks**

09:10- **Plenary** **Mikio Sakai – What technologies are essential in development of**
09:55 **the DEM-based digital twin?**

Location: H11

09:55- *Morning*
10:25 *break*

10:25- **Morning**
12:30 **session**

Session 1: **Granulate-
structure interaction**

Session 2: **Coupled
Methods I**

Mini-Symposium:
**Packings and
jamming: a journey
through scales**

Location: H11	Location: H12	Location: H13
Modeling of a laboratory cone crusher using the discrete element method – M. Moncada , F. Betancourt, C.G. Rodríguez, P. Toledo	Inertial focusing of a dilute suspension in pipe flow – O. Aouane , J. Harting	Fabric and granular plasticity – F. Radjai
DEM modelling of object penetrating through granular media with different particle shapes – H. Shi , E. Hageman, J. Jovanona, D. Schott	A Phase-Field Discrete Element Method to study chemo-mechanical coupling in granular materials – A. S.-Morane , H. Rattez, M. Veveakis	Structural, vibrational, mechanical properties of jammed packings of deformable particles – C. O'Hern
Numerical Simulations of the Penetration Process of Open-Ended Piles using DEM – N. Sommer , M. Kidane, A. A. Peña-Olarte, R. Cudmani	Investigation of a particle location-based multi-level DEM coarse graining model for bulk material flow and fluidized particle systems – V. Brandt , J. Grabowski, N. Jurtz, M. Kraume, H. K.-Emden	Pushing the high-pressure limit of jamming in granular matter – J. T. Clemmer , J. M. Monti, J. B. Lechman
Stress redistributions under varying trapdoor configurations for buried structures using DEM – U. Ali	DEM and CFD-DEM: Recent progress and path into the future – C. Kloss , C. Goniva	Shape-driven, emergent behavior in active particle systems – P. Schönhöfer
Propulsion of a scallop-like swimmer in granular matter – H. Xiao , H. Torres, Ac. Sack, T. Pöschel	Particle-resolved simulation of antidune migration via a coupled free-surface lattice Boltzmann and discrete element method – C. Rettinger , C. Schwarzmeier, S. Kemmler, J. Plewinski, F.	

N.-González, H. Köstler,

U. Rüde, B. Vowinckel

12:30- *Lunch*
14:00

14:00- **Plenary** **Antonio Munjiza – Grand Challenge of AI-based Virtual Experimentation using DEM, FDEM, and Hybrid Simulation Technology**

Location: H11

14:45- *Afternoon*
15:15 *break*

15:15- 17:20	Afternoon session	Session 3: Polydisperse systems	Session 4: Coupled Methods II	Mini-Symposium: <u>SALTED: algorithms and applications for static packing problems</u>
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Location: H11

Location: H12

Location: H13

Collapse of polydisperse columns: looking for a scaling between energy and mobility– O. Polanía, M. Renouf, N. Estrada, M. Cabrera, E. Azéma

Transient size segregation of binary granular mixtures– S.Kumawat, V. K. Sahu, A. Majumdar, S. Patro, A. Tripathi

Coarse-grained DEM simulation of non-spherical and poly-dispersed particles– K.

Multiscale, multiphysics modeling of granular materials – Volume- & surface-coupled discrete particle simulations in MercuryDPM– I. Weinhart, H. Cheng, A. Hazel, S. Luding, A. Thornton

DEM simulations of wind-blown sand and dust transport– S. Kamath, E. J. R. Parteli

Investigation of Submerged Granular Column Collapse Using

SALTED – A High-Performance Simulator for Granular Packings– N. Topic, T. Pöschel

An Open-Source Software for Sequential Particle Deposition– V. Angelidakis

Universal structure of cohesive particle agglomerates after many dispersion-settling cycles– D. E. Wolf

Evolution of charged agglomerate statistics under continued binary

<u>Washino</u> , E. L. Chan, T. Tsuji, T. Tanaka	LBM-DEM Simulation– <u>Z. collisions–</u> F. Führer, <u>L. Ge</u> , T. Man, S. A. G. Torres <u>Brendel</u> , D. E. Wolf
Micromechanical Effects of Sample Scale in Size Polydisperse Granular Materials under Simple Shear– <u>D. Cantor</u> , C. Ovalle	The performance of a deep-sea mining vehicle based on DEM-CFD coupling method– <u>Z. Wei</u>
Granular gas mixtures: DEM simulations compared with experiments– <u>D. Puzyrev</u> , K. Harth, T. Trittel, R. C. Hidalgo, R. Stannarius	Metaball DEM for Non-Spherical Particles with Realistic Shapes– <u>P. Zhang</u>

18:00 *Conference dinner*

19:00- **Evening talk** **Troy Shinbrot –** Challenges for DEM from the lab and nature
20:00

September 19, 2023 (Day 2- Tuesday)

09:30- **Plenary** **Nicolin Govender –** Particle shape effects in granular material using GPU DEM: An industry perspective
10:15

Location: H11

10:15- *Morning break*
10:45

10:45- 12:50	Morning session	Session 5: Cohesive and capillary interactions	Session 6: Particle-fluid interactions in industrial applications I	Mini-Symposium: <u>Advancements in additive manufacturing</u>
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<u>processes through the use of the Discrete Element Method (DEM)</u>		
Location: H11	Location: H12	Location: H13
JKR theory-based force-displacement relation for DEM simulations of adhesive particles– <u>J. Chen</u>, D. Krengel, D. Nishiura, M. Furuichi, H.G. Matuttis	DEM simulation of multiphase flow in solid rocket motor– <u>W. Yang</u>, X. Wu, Q. Sheng, H. Chen, P. Liu	DEM simulation-based study on segregation mechanisms of the powder layer in the selective laser sintering of drug-loaded tablets– <u>Y. Tan</u>, D. S. Nasato, H. Briesen
Micro understanding of the elastic response of soft/tiff mixture packings using multi-modular X-ray characterisation and Discrete Element Method– <u>K.Taghizadeh</u>, M. Ruf, S. Luding, H. Steeb	Beyond the Black Box: How DEM Gives a New Approach to Vertical Stirred Milling– <u>D. Rhymer</u>, A. Ingram, K.W. Yule	Contact rheology model for visco-elastic powders during laser sintering– <u>J. E. Alvarez</u>, H. Cheng, S. Luding, T. Weinhart
Lithium-Ion battery electrode as a cohesive granular material – <u>M. Sonzogni</u>, J.M. Vanson, Y. Reynier, S. Martinet, K. Ioannidou, F. Radjai	A coupled discrete element lattice Boltzmann method study of bijels as a novel type of catalyst support structure– <u>J. Beunen</u>, J. Harting	Continuum Based Simulation for Additive Manufacturing– <u>D. Soldner</u>, L. Herrnböck, C. Burkhardt, J. Mergheim, P. Steinmann
Coarse-grain Discrete Element Modelling of wet particles in a	Grain-scale behavior of erosion/sedimentation process studied by DEM/CFD coupling simulation– <u>T. Matsushima</u>	
	Simulation of a continuous vertical stirred mill using DEM, CFD, DPM, and the UFRJ mechanistic model– R.	

rotating drum– [R. S. Larijani](#), V. Magnanimo, S. Luding
M. de Carvalho, A.L.M. Oliveira, [H. A. Petit](#), L. M. Tavares

The effect of particle shape, particle size, and multiple inter-particle contacts on the DEM modelling of water menisci for coarse-grained materials– [D. Barreto](#), J. Leak, V. Dimitriadi

13:00-14:00 *Lunch*

14:00-14:45 **Plenary** **Yuntian Feng** – The Developments of the Energy-Conserving Contact (ECC) Theory and Contact Models for Arbitrarily Shaped Particles
Location: H11

14:45-15:15 *Afternoon break*

15:15-17:20	Afternoon session	Session 7: Granular metamaterials	Session 8: Powder processes & technologies	Mini-Symposium: <u>The applications and algorithms of coupled MPM-DEM</u>
		Location: H11	Location: H12	Location: H13

Stability of geometrically cohesive granular columns made of star-shaped grains– [D. Aponte](#), N. Estrada, J. Barès, M. Renouf, E. Azéma
Jammed granular

Digital twins to improve the calibration of DEM simulation of powder processes– [A. Neveu](#), G. Lumay, F. Francqui
Numerical study of bidisperse cohesive particle blends – bulk

Implementation of coupled material point-discrete element method (MPDEM) in Taichi parallel programming language– [Y. Shi](#)
Recent advances in the coupling of discrete

		metamaterials–<u>H.</u> Götz, T. Pöschel, O. D'Angelo	properties and thresholds– <u>L. Orefice, J.</u> Khinast	element methods with meshless partial differential equation solvers- <u>S. A. G. Torres</u>
		Elastic behavior of granular materials composed of polyhedral particles– D.-C. Vu, <u>L. Amarsid, J.-</u> Y. Delenne, V. Richefeu, F. Radjai	Investigation of Bulk Material Effects on Reclaim Screw Performance: A DEM- Based Modelling Approach- E. van Gijsen, W. van den Bos, F. van den Hoogen, <u>D. Schott</u>	
		Soft particles reinforce robotic grippers – robotic grippers based on granular jamming of soft particles– <u>P.</u> <u>Müller</u>, H. Götz, A. Santarossa, A. Sack, T. Pöschel	Growth and Acceptance: DEM in Industry– <u>L. D.</u> <u>Cid</u>	
		Mechanical characterisation of highly interlocked granular metamaterials- <u>V.</u> <u>Angelidakis</u>, T. Pöschel		
17:20- 17:50	<i>Evening break – finger food served</i>			
17:50- 20:20	Evening session	Session 9: Algorithmic aspects of DEM	Session 10: Flexible shape particles	
		Location: H11	Location: H12	
		A Level Set approach	Discrete Element	

for non-spherical DEM in YADE– <u>J. Duriez</u> , S. Bonelli, F. Golay, C. Galusinski	Modelling of Flexible and Shape Memory Fibres– <u>Y. Guo</u> , J. Han
Modelling Complex Particle Shapes with the Volume-interacting Level-Set Discrete Element Method– <u>D. L. H. van der Haven</u> , I. S. Fragkopoulos, J. A. Elliott	Calibration of a Discrete Element Model of Gelatine– H. Grobbelaar, D. N.J. Els, <u>C. Coetzee</u>
A new molecular dynamics-like approach for true polyhedra assemblies – Application to the simulation of crushing– <u>Y. Descantes</u>	Modeling soft particles by a coupled DEM-MPM method– <u>S. Nezamabadi</u> , F. Radjai, S. Mora, J.-Y. Delenne, M. Ghadiri
A novel superellipsoid particle collision model– <u>J. Wedel</u> , P. Steinmann, M. Hribersek, J. Ravnik	Discrete element method for a smooth polyhedron with rigidity and large deformation based on Minkowski sum method– <u>S. Ji</u> , S. Wang
Stable integration of rotations for non-spherical particles in the Discrete Element Method– <u>C. A. del Valle</u> , V. Angelidakis, S. Roy, T. Pöschel, J. D. Muñoz	

September 20, 2023 (Day 3- Wednesday)

09:30-10:15	Plenary	Emilien Azéma – <u>Exploring the scales in highly deformable grain assemblies when compressed far beyond the jammed state</u>		
		Location: H11		
10:15-10:45	<i>Morning break</i>			
10:45-12:50	Morning session	Session 11: Particle-fluid interactions in industrial applications II	Mini-Symposium: <u>DEM-based hybrid algorithms for particle-laden flows</u>	Mini-Symposium: <u>Advances in open-source DEM software</u>
		Location: H11	Location: H12	Location: H13
		CFD/DEM simulations of a pilot scale blast furnace raceways dynamics- <u>E. Izard</u>, F. Romano, P. Fede	Simulations of magnetic anisotropic particles at fluid-fluid interfaces– <u>Q. Xie</u>, J. Harting	LMGC90- a Python Framework to simulate non-smooth mechanical discrete systems – F. Dubois, <u>R. Mozul</u>
		Numerical modeling of wet ball milling process by CFD-DEM-VOF– <u>H. Ma</u>, C. Xie, L. Zhou, Y. Zhao	Self-assembly of Amphiphilic Janus Spheres: Lattice Boltzmann-Discrete Element simulations for Soft Matter- <u>G. Nath</u>	MercuryDPM: Fast, flexible, particle simulations- <u>A. Thornton</u>, T. Plath, I. Ostanin, T. Weinhart
		DEM-SPH based ship-ice-water-propeller coupling simulation for ship speed analysis in sea ice regions– <u>L. Liu</u>, S. Ji	Capillary Interactions, aggregate formation, and the rheology of particle-laden flows with a hybrid discrete element and lattice Boltzmann method- <u>J. Harting</u>, L. Yang, M. Sega	YADE – An open-source framework for open-science- <u>B. Chareyre</u>, V. Angelidakis, K. Boschi, K. Brzeziński, R. A. Caulk, C. A. del Valle, J. Duriez, A. Gladky, J. Kozicki, G. Pekmezi, L. Sholtès, K. Thoeni
		Investigation of high-throughput particle separation in DLD-DEP	Wave Propagation in	

		microsystems by resolved CFD-DEM simulations– M. S. Wullenweber , J. Kottmeier, I. Kampen, A. Dietzel, A. Kwade	Fluid-Saturated Granular Media using Coupled Lattice Boltzmann-Discrete Element Method– H. Cheng , S. Luding, J. Harting, V. Magnanimo
13:00- 14:00	Lunch		
14:00- 14:45	Plenary	Hongyang Cheng – From Granular Randomness to Predictive Digital Twins: Integrating Data-Driven and Coupled Models for Uncertainty Quantification Location: H11	
14:45- 15:15	Afternoon break		
15:15- 17:20	Afternoon session	Session 12: Vibrated systems & charged particles Location: H11	Session 13: Powder processes technology: Additive Manufacturing Location: H12
			Mini-Symposium: The future of open-source DEM – Discussion Location: H13
		Discrete-element modeling and experimental validation of the charging kinetics of a vibrated layer of particles – K. Lampoh , F. Radjai, C. M.-Laigle, X. Rouau, J.-Y. Delenne Tribocharging of patchy particles – N.	Microstructure evolution during sintering: Discrete Element Method approach - D. E. Wolf , L. Engelke, L. Brendel Wall effects in granular column: Revisiting Janssen’s equation - P Jalali, S. Shah , L. Kondic

Preud'homme, G.	Powder spreading of
Lumay, N. Vandewalle,	irregular particles with
<u>E. Opsomer</u>	thermal properties- <u>S. Roy</u> ,
	H. Xiao, V. Angelidakis, T.
About phase transition	Pöschel
in vibrated granular	
material- <u>W. Le Goff</u> , M.	Sintering of particles:
Renouf, R. Fargere	grain-growth and non-
	sphericity treated with
A discrete element	DEM- <u>B. M. P. Goyes</u> , D.
model for investigating	Jauffres, C. L. Martin
the electromechanical	
characteristics of	Computational studies of
particulate systems- <u>C.</u>	the effect of moisture on
<u>Zhang</u> , S. Nadimi	powder bed quality in
	metal additive
Granular Convection in	manufacturing– <u>H.</u>
Micro-Gravity– <u>I.</u>	<u>Cherukuri</u> , A. Chakraborty
<u>Pöschel</u> , H. Götz, J. A.	
Freund	

17:20- **Poster**
18:50 **session**

18:30 *Finger food*
served

18:50- **Evening** **Dirk Helbing – The Wonderful World of Pedestrians**
19:50 **talk**

19:50- **Awards Ceremony**
20:30

September 21, 2023 (Day 4- Thursday)