H2020-MSCA-ITN-2020

PROJECT #955661

tusail

The Final Lap

As TUSAIL moves into its final year, we can scarcely believe where the time has gone. Since our last newsletter (May 2023), our ESRs have either changed employer or undertaken secondments within our network. This is very much in line with our proposal to support EU strategy on youth mobility by drawing on TUSAIL's many mature and successful academia-industry partnerships. The opportunities to gain inter-sectorial experiences widen the scope of ESR research projects, support collaboration and enhance employability as the ESRs navigate their aspiring career paths.

Our scientific goals and deliverables are progressing towards the final phase. ESRs are regularly attending and participating at conferences as well starting to publish their findings. We have met in Linz, Nuremberg and Erlangen to continue our tailored, advanced scientific training, engage in thought-provoking scientific discussions, and to consider more fully opportunities for outreach and dissemination (a few highlights are given in this Newsletter). In March, we look forward to our last Doctoral School in Lausanne, Switzerland, where we will be hosted by Dr Yogesh Harshe at *Nestlé* Research.

Myself and the team at Edinburgh will be chairing and hosting the 11th International Conference on Conveying and Handling of Particulate Solids (CHoPS) from 2 – 4 September 2024 at the excellent Edinburgh International Conference Centre. The final TUSAIL Symposium will be held in conjunction with the CHoPS Conference whereby the key themes from TUSAIL will be integrated throughout the conference programme and all the ESRs will be presenting their research outcomes. The event presents a unique forum to promote the exchange of technical and scientific information across the academic and industrial sectors in the multidisciplinary field of handling and processing of particulate solids. We expect to see a strong international participation with delegates from around the world.

-Prof. Jin Ooi, Project Coordinator

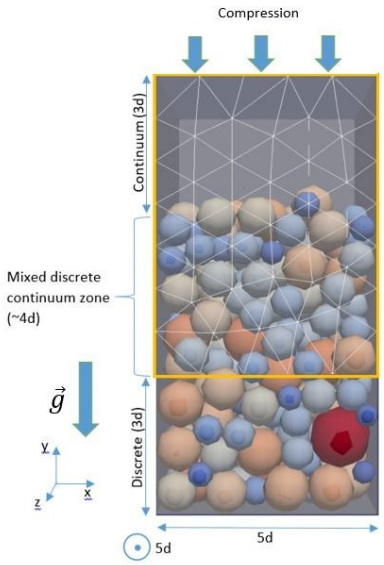
Our ESRs

Are you curious about solid/fluid transition in powders?

*Ever wondered how granular materials like sand, sugar, or detergent powder transition between solid and fluid phases? Then meet our ESR **Retief Lubbe** from South Africa. Retief obtained his master's degree in Geotechnical Engineering from Tsinghua University, China. Currently, the objective of his PhD is to find a viable continuum solution for the transitions in consumer goods and industry.*

Retief is located at the University of Twente, NL, and has his secondment at SACMI in Imola, Italy. He is currently doing his placement at Procter & Gamble Newcsatle Innovation Centre in UK.

Are you interested in DEM – FEM coupled simulations?



*Are you interested in coupling DEM and FEM simulations? Then you should meet our ESR **Akhil Mathews** from India! Akhil is an aerospace engineer who got fascinated by the complexity and intriguing features of granular flows. He obtained his M.tech. at the Indian Institute of Technology Kanpur, India. He worked as a project engineer at IIT Kanpur on an ISRO funded project and contributed to the development of a parallelized DEM code. Those experiences make him a perfect fit for a TUSAIL project on mixed discrete-continuum modelling of dense granular flows that are either stagnant or exhibit mass flows, e.g. particle compaction and silo flows. The overall objective of his project is to develop an upscaling framework from discrete to continuum and back to discrete. Akhil is located at The University of Edinburgh, UK and has his secondment at Altair EDEM.*

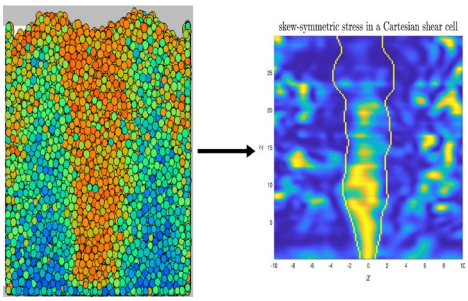
Our ESRs

Are you interested in obtaining continuous fields from DEM simulations?

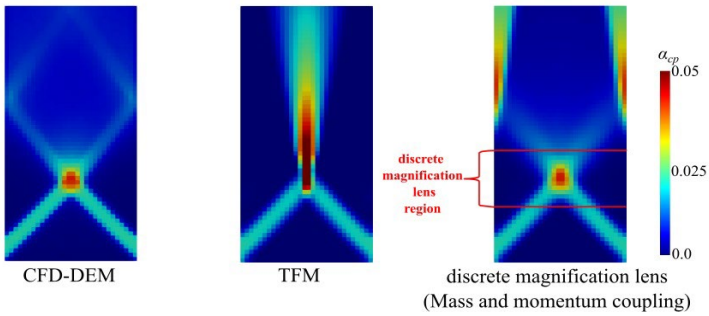
*Have you ever wondered about the influence of particle rotation on the whole bulk? If so, you should meet our ESR **Max Wilkelmann** from Germany.*

He obtained his M.Sc. in engineering science from Technical University of Berlin. His master's thesis on the 'relaxation behavior of micropolar ferrofluids by means of homogenisation' builds the bridge to his current PhD project in which he is working on up-scaling methods from discrete to continuum level for granular materials with respect of micropolar theory.

Max has started his PhD at the University of Twente, the Netherlands, and is now located at The University of Edinburgh, United Kingdom. In addition, he will start a secondment at Altair EDEM soon.



Are you interested in simulating particle-laden flows using the TFM and CFD-DEM approaches?



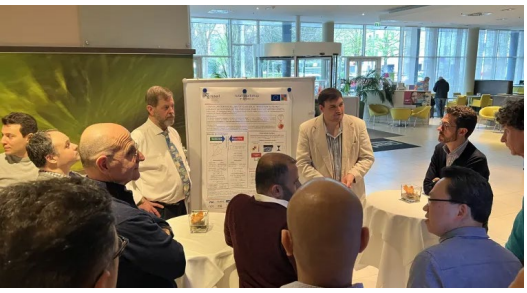
*Are you interested in coupling CFD-DEM approach with TFM method? Then you should meet our ESR **Behrad Esgandari**, from Iran. He received his master's degree from the University of Tehran, where he focused on CFD-DEM simulations of non-spherical particles in spouted fluidized beds, making him an ideal candidate for TUSAIL!*

Behrad is now working on discrete particle zoom in continuum Two Fluid Model (TFM) simulations of spout fluidized beds at Johannes Kepler Universität Linz, Austria.

His main focus is to establish a hybrid multiscale modelling approach using the TFM and CFD-DEM approaches, where the CFD-DEM approach can be used in a small region of interest in a TFM simulation to improve the behavior of the TFM simulation. Behrad's industrial secondments are at BASF and DCS Computing GmbH.

4th Doctoral School

CFDEM-TUSAIL 2023 @Linz



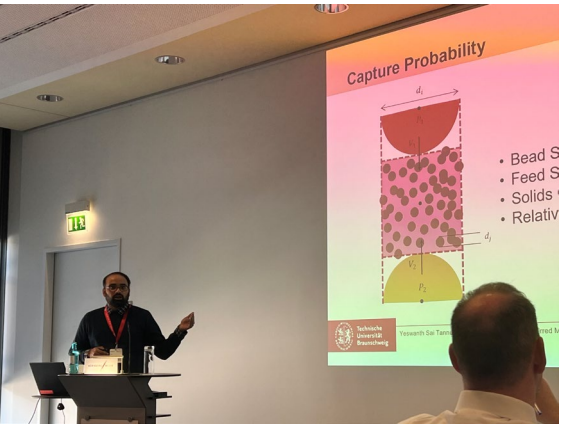
We started our 4th Tusail School in Linz, Austria, in conjunction with the 4th Aspherix & CFDEM Conference organized by DCS Computing GmbH. The event began with a poster session showcasing the individual projects of the ESRs, grouped according to their common unit operations. The following day, scientific discussions continued with groups organized by methodology. The latter part of the week saw us participating in the Aspherix and CFDEM conference, attending many engaging presentations and interesting keynote lectures from BASF, P&G, Astrazeneca just to name a few. TUSAIL also hosted a dedicated session where ESRs presented their work.

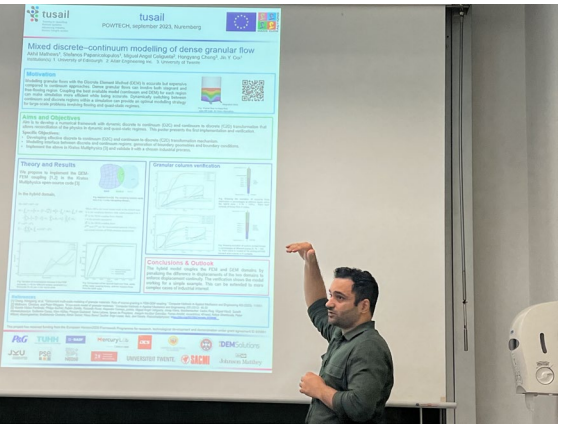
Moving into the next week, we explored discussions and collaborative efforts focused on the granular material database, a project led by TUSAIL and intended for public access within the scientific community. Accessible at: graindb.info

Throughout the week, we engaged in stimulating courses covering topics such as non-spherical particles, intellectual property, deformable particles, industrial project management, and the application of AI to granular systems, among others. Additionally, we had the opportunity to explore the Ars Electronica Center in Linz, providing a unique perspective on ingenuity and creative expression.

5th Doctoral School

PARTEC-TUSAIL 2023





The 5th doctoral school hosted by TU Braunschweig took off at Nürnberg alongside the annual PARTEC conference. Our ESRs gave talks and poster presentations at the “Innovations in modeling and simulation” session. Prof. Ooi (TUSAIL Project Coordinator) introduced ‘TUSAIL and its mission’ to the POWTECH Expert Forum. Visits were arranged to different booths at the Exhibition and the ESRs interacted with leading manufacturers in the powder processing industry at the exhibition.

The 2nd day of the school started at FAU, Erlangen. The ESRs engaged in intensive discussions with the consortium experts on their respective research topics. A themed discussion was held on common research challenges, calibration and validation, experimental data storage and classification norms as well as other relevant topics.

The afternoon started with a session on “Perspectives on particles in contact” by Prof. Wolfgang Peukert, the local head of the institute hosting the TUSAIL consortium in Erlangen. This was followed by a tour around the particle characterization lab and the ESRs were introduced to the working of different breakage characterization techniques.

5th Doctoral School

TUSAIL @Braunschweig 2023

Following the sessions of Erlangen and Nürnberg, the last part of the 5th Doctoral school started at the Institute for Particle Technology, TU Braunschweig. Lectures and workshops on the theme milling and grinding were organized.

The local ESRs organized social and teambuilding activities on 3rd October, which is a National Holiday in Germany. The ESRs were interviewed on the TUBS campus premises about their experiences in TUSAIL so far. A short version of the interview can be found in the LinkedIn page of TUSAIL.

The school concluded with a session on “How to have an effective scientific discussion”, followed by a photo session and farewell lunch.

Outreach Activities

Primary Engineer

Afshin Taghizadeh, Akhil Mathews and Oguzhan Erken joined with Primary Engineer to deliver a training programme to support primary school teachers in designing inspiring and effective engineering/STEM based lessons for young children.

Girlsday2023 @ UT

Retief Lubbe and colleagues at the University of Twente hosted groups of 10-15 year old girls as part of a national campaign to stimulate their interest in science, technology, engineering and mathematics (STEM). These students were introduced to the wonders of science of multiple disciplines, ranging from electrical engineering to soil mechanics; from privacy to novel materials at the nanoscale using supercomputers; and from and Citizen Science to Healthcare.

Tusail ESRs at FluidizationXVII

Pursuing a Ph.D. within an ITN can feel quite different from following a classical Ph.D. track. Two of our TUSAIL fellows, Roxana Saghafian Larijani and Max Winkelmann, shared their experiences of the benefits and challenges of being part of an ITN at the FluidizationXVII conference in Edinburgh as part of the Social Values Programme. We would like to thank Christine Hrenya for the invitation.

News and Events

CHoPS 2024: Call for Abstracts

Authors are invited to submit abstracts for all aspects of particle science and technology and their application to a vast range of industrial challenges.

For full guidelines, please visit https://chops2024.ed.ac.uk/posts/call_for_abstracts/

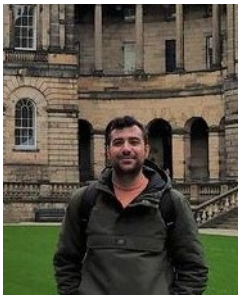
Final Symposium

The final TUSAIL Symposium will be held in conjunction with CHoPS XI to disseminate TUSAIL's outcomes to the scientific community. This will be hosted in Edinburgh in September 2024. To communicate their findings, ESR talks will be included across the thematic areas of the conference. For more information about CHoPS, please visit the conference website www.chops2024.ed.ac.uk.

Upcoming Doctoral School VI in Lausanne, Switzerland

Our 6th Doctoral School will be held by Nestlé Research in Lausanne, Switzerland. We will meet on 12th March 2024 for scientific discussions, and then continue with densely-packed programme of scientific training, exploring opportunities for collaboration until 15th March 2024.

Highlighted Publications



Parameters affecting plug characteristics in dense phase pneumatic conveying of ellipsoidal particles

Oguzhan Erken and colleagues examine the plug flow of ellipsoidal particles in dense phase horizontal pneumatic conveying using coupled CFD–DEM simulations. They investigate the effect of particle shape, contact parameters, and pressure drop in the pipe on four plug characteristics: velocity, length, porosity, and particle exchange rate with the stationary bed.

https://doi.org/10.1016/j.powtec.2024.119561

The Consortium

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SACMI

- Riccardo Cenni

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Inspiring science, enhancing life

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TUSAIL

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