

Editorial: Powders & Grains 2025 10th International Conference on Micromechanics of Granular Media

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Abstract. Despite being the second most handled material after water and after decades of research, the study of granular/particulate matter challenges researchers and practitioners in industries alike. For example, the handling, storage, and processing of granular materials in industries are far from efficient; the prediction of geophysical phenomena, such as the onset of landslides and avalanches, needs significant improvement with new ideas. Various planetary explorations to the Moon, Mars, and other planets and satellites require adequate understanding of the dust and soil/regolith of these extraterrestrial bodies under extreme atmospheric conditions. Therefore, any new knowledge and advancement in granular matter has tremendous potential to impact our economy and sustainable livelihood. *Powders & Grains 2025 (P&G2025)* is the “10th International Conference on Micro-mechanics of Granular Media” that brought together researchers working on both fundamental aspects of granular materials and its technological applications. This volume includes papers presented at P&G2025, providing an up-to-date overview of the present state-of-the-art in granular matter. In addition to the topics dedicated exclusively to powders and grains, this volume covers emerging topics such as additive manufacturing, microgravity, tribo-charging, active particles, and the application of AI & ML techniques to the modelling of granular materials.

1 Powders & Grains: goals and scope

Powders & Grains is the premier international scientific conference organized once in four years under the auspices of the Association pour l'Etude de la Micromécanique des Milieux Granulaires (AEMMG). The goal of this quadrennial conference is to share the state-of-the-art in the physics and mechanics of granular media. It distinguishes itself from other meetings on granular materials by: (a) the mixture of disciplines, (b) single session talks, (c) dedicated slots for poster presentations on all five days of the conference and (d) refereed conference papers published online before the meeting. Past meetings were hosted at Clermont-Ferrand (1989), Birmingham (1993), Durham (1997), Sendai (2001), Stuttgart (2005), Golden (2009), Sydney (2013), Montpellier (2017) and Buenos

Aires (2021). The proceedings of the most recent editions can be accessed at

- P&G 2021: [EPJ-WoC, Vol. 249](#)
- P&G 2017: [EPJ-WoC, Vol. 140](#)
- P&G 2013: [AIP Conf. Proc., Vol. 1542](#)
- P&G 2009: [AIP Conf. Proc., Vol. 1145](#)

The 2025 edition of P&G is also the 10th “International Conference on the Micro-mechanics of Granular Media”, which took place at *Novotel Goa Resort & Spa, Candolim*, Goa, India, during 8-12 December 2025. This collection includes all papers presented at P&G2025 conference. The volume has a total of 202 papers, with 8 by invited speakers and the rest by contributing authors. The papers are organized into 12 sections as follows:

1. Invited speakers
2. Rheology and constitutive modelling
3. Kinetic theory and granular gas
4. Jamming, rigidity and shear-thickening transitions
5. Polydispersity, segregation and pattern formation

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6. Geophysical, environmental & planetary processes
7. Geomaterials
8. Particulate multiphase flows and porous media
9. Particle-based numerical methods
10. Experimental methods for granular mechanics
11. Powders and grains in pharma- and food processes
12. Emerging topics: Additive manufacturing & meta-materials, microgravity, tribo-charging, active particles, and artificial intelligence & machine learning

Each contributed paper was reviewed by at least two anonymous colleagues selected from the Scientific Committee, the invited speakers, the Local Committee, and other experts in the field. Each invited contribution was reviewed by at least three anonymous colleagues. The peer review process took six months.

2 Organizing Committees

2.1 AEMMG Association

The “Association pour l’Etude de la MicroMécanique des Milieux Granulaires” (AEMMG, <https://www.powdersandgrains.org>) is an association created to promote the quadrennial Powders & Grains meetings. AEMMG was founded in 1989 in France, and the first edition of P&G meeting took place in Clermont-Ferrand, France in its foundation year. The AEMMG board is currently formed by

- Stefan Luding, President
- Gioacchino Viggiani, Vice-president
- Jean-Noël Roux, Secretary/Treasurer

The AEMMG committee includes international researchers working on granular materials and suspensions. The members of the AEMMG committee act as the Scientific Committee for the P&G conference, and one of their responsibilities is to serve as reviewers for papers submitted to P&G proceedings. Here is the complete list at the time of the P&G2025 conference:

- Alam, Meheboob, JNCASR, Bengaluru, India
- Amon, Axelle, University of Rennes, France
- Aste, Tomaso, University College London, UK
- Bagi, Katalin, Budapest Univ Tech & Econ, Hungary
- Cambou, Bernard, Ecole Centrale de Lyon, France
- Chakraborty, Bulbul, Brandes University, USA
- Chang, CS, Univ. Massachusetts Amherst, USA
- Darve, Felix, Institute Polytech de Grenoble, France
- Dijkstra, Joshua, Univ. Amsterdam, Netherlands
- Einav, Itai, University of Sydney, Australia
- Ghadiri, Mojtaba, University of Leeds, UK
- Gray, Nico, University of Manchester, UK
- Guazzelli, Elisabeth, Université de Paris, France
- Hatano, Takahiro, Osaka University, Japan
- Hayakawa, Hisao, Kyoto University, Japan
- Herrmann, Hans J, PMMH, ESPCI, France
- Hou, May, Chinese Academy of Sciences, China
- Hrenya, Christine, Univ. Colorado Boulder, USA
- Jaeger, Heinrich, University of Chicago, USA
- Jenkins, Jim T, Cornell University, USA
- Jiang, Mingjing, Tongji University, China
- Kamrin, Ken, University of California Berkeley, USA
- Khakhar, Devang V, IIT Bombay, India
- La Ragione, Luigi, Politecnico di Bari, Italy
- Luding, Stefan, University of Twente, Netherlands
- Maeda, Kenichi, Nagoya Institute of Technology, Japan
- Magnanimo, Vanessa, Univ. Twente, Netherlands
- Makse, Hernan, The City University of New York, USA
- Manning, Lisa, Syracuse University, USA
- Marks, Benjy, University of Sydney, Australia
- Matsushima, Takashi, University of Tsukuba, Japan
- Mehta, Anita, Oxford University, UK
- Melo, Francisco, Universidad de Santiago, Chile
- Mujica, Nicolás, Universidad de Chile, Chile
- Nakagawa, Masami, Colorado School of Mines, USA
- Nott, Prabhu R, Indian Institute of Science, Bengaluru
- O’Sullivan, Catherine, Imperial College London, UK
- Ooi, Jin, University of Edinburgh, UK
- Pellenq, Roland, Massachusetts Institute of Technology
- Pöschel, Thorsten, FAU Erlangen-Nürnberg, Germany
- Pouliquen, Olivier, Aix-Marseille Université, France
- Pugnaloni, Luis, Univ Nacional de La Pampa, Argentina
- Radjai, Farhang, University of Montpellier, France
- Roux, JN, Univ. Gustave Eiffel, École des Ponts, France
- Schröter, Matthias, University of Göttingen, Germany
- Sharma, Ishan, IIT Kanpur, India
- Shattuck, Mark, The City University of New York, USA
- Thornton, Anthony, University of Twente, Netherlands
- Thornton, Colin, University of Birmingham, UK
- Tordesillas, Antoinette, Univ. Melbourne, Australia
- Vidales, Ana M, Univ Nacional de San Luis, Argentina
- Viggiani, Cino, Université Grenoble Alpes, France
- Wyart, Matthieu, EPFL, Switzerland
- Yang, Runyu, Univ. New South Wales, Australia
- Yu, Aibing, China
- Zhao, Jidong, Hong Kong Univ. Sci. Tech., China
- Zuriguel, Iker, University of Navarra, Spain

2.2 Local Organizing Committee

The local organizing committee (LOC) of the P&G2025 conference was composed of a number of colleagues from various institutes within and outside India.

- Animesh Pandey, JNCASR, Bengaluru
- Anugrah Singh, IIT Guwahati
- Arghya Das, IIT Kanpur
- Ashish Bhateja, IIT Goa
- Ashish Orpe, CSIR National Chemical Lab, Pune
- Ishan Sharma, IIT Kanpur
- K. Anki Reddy, IIT Tirupati
- Manaswita Bose, IIT Bombay
- Meheboob Alam (Chair of LOC)
JNCASR, Bengaluru
- Mousumi Mukherjee, IIT Mandi
- Priyanka Shukla, IIT Madras
- Rajaram Lakkaraju, IIT Kharagpur
- Rakesh J Pillai, IIT Palakkad
- Saikat Saha, IIT Roorkee
- Samik Nag, Tata Steel Ltd. Jamshedpur
- Sovan Lal Das, IIT Palakkad
- Subir K Das, JNCASR, Bengaluru
- Sudeshna Roy, Germany/India
- Tejas Murthy, Indian Institute of Science, Bengaluru
- Vijayakumar Chikkadi, IISER Pune

2.2.1 Local Advisory Committee

- Devang V Khakhar, IIT Bombay
- Prabhu R Nott, Indian Institute of Science, Bengaluru

2.2.2 Fund Committee

- Anugrah Singh, IIT Guwahati
- Arghya Das, IIT Kanpur
- Priyanka Shukla, IIT Madras
- Samik Nag, Tata Steel Ltd. Jamshedpur

3 Invited Speakers

The invited speakers were elected/selected from a list of about 75 nominated candidates, first by voting by the AEMMG Committee members, followed by a series of consultations with the AEMMG board.

- Axelle Amon, University of Rennes, France
“Creep Response of Granular Materials”
- Benjy Marks, University of Sydney, Australia
“Heterarchical Granular Dynamics: A State of the Art”
- Bulbul Chakraborty, Brandeis University, USA
“Rigidity of Fragile Matter: A Gauge Theoretic Perspective”
- Catherine O’Sullivan, Imperial College London, UK
“Coupled Phenomena in Soil: Examples of Insights Gained from Multi-physics Particle-scale Simulation”
- Devang V Khakhar, IIT Bombay, India
“Computational and Experimental Analyses of Granular Flow in Hoppers”
- Farhang Radjai, University of Montpellier, France
“Stress Transmission and Fabric States in Granular Materials”
- Ishan Sharma, IIT Kanpur, India
“Regolith Dynamics on Small Bodies in the Solar System”
- Joshua A Dijkstra, Univ. Amsterdam, Netherlands
“Agglomeration during Reactive Extrusion of Particle-based Biomass Pellets”

4 Acknowledgements

The editors thank all reviewers for sending their timely reports that helped to publish this volume before the conference (1st December 2025). The organizers thank the ‘Jawaharlal Nehru Centre for Advanced Scientific Research’ (JNCASR), Bengaluru, for being the host institute of P&G2025 with all help and cooperation on administrative and financial matters. The organisers also thank JNCASR, the Indian Institute of Technology (IIT) Palakkad, two sponsoring companies (1) ‘ROCKMECH IT Solutions Private Limited’ (jointly with ITASCA Software) and (2) ‘ALTAIR’ for partial financial support, and the “Granular Matter” Journal for poster awards.