

Colloquium n. 645 - Nonlinear dynamics at zero Reynolds number

Dates and location

21 May — 23 May 2024, London, UK

Chairperson

Eric Keaveny

Co-chairperson

Blaise Delmotte

Conference fees

- Regular registration: **205.00 €**
- Invited Speakers: **0.00 €**

What other funding was obtained?

- Funding from LadHyX: 2000 euros
- Funding from Imperial College: ????
- Funding from CNRS UMI Abraham de Moivre: ????

What were the participants offered?

The registration fees included:

- An Imperial College tote bag
- A notepad + pen
- 2 daily coffee breaks and 3 lunches.
- A wine reception and gala dinner at 170 Queen's Gate Terrace (a mansion belonging to Imperial College)

Applicants (members)

1. Anais Abramian
2. Gonçalo Antunes
3. Guido Bolognesi
4. Matthew Butler
5. Bethany Clarke
6. Luke Debono
7. Marco De Corato
8. Blaise Delmotte
9. Nikhil Desai
10. Camille Duprat
11. Stephen Ebbens
12. Heiko Herrmann
13. Yongyun Hwang
14. Anne Juel
15. Catherine Kamal
16. Eric Keaveny
17. Anke Lindner
18. Sebastien Michelin
19. Tom Montenegro-Johnson
20. Alexander Morozov
21. Franck Nicoud
22. Tim Pedley
23. Ory Schnitzer
24. Juliane Simmchen
25. Hang Su
26. Catalin Vlad
27. Benjamin Walker

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Applicants (non members)

1. David Abrahams
2. Jaime Agudo-Canalejo
3. Irene Anello
4. Florencio Balboa Usabiaga
5. John Ball
6. Martine Ben Amar
7. Freya Bull
8. Antonio De Simone
9. Marcelo Dias
10. Maria L. Ekiel-Jezewska
11. Sebastian Fürthauer
12. Ramin Golestanian
13. Simon Gsell
14. Isabella Guido
15. Yuto Hosaka
16. Sara Jabbari Farouji
17. Robin Knops
18. Christina Kurzthaler
19. Heng Li
20. Corinna Maass
21. RUMA MAITY
22. Yevgen Melikhov
23. Ilteber Ozdemir
24. Gunnar Peng
25. Chiara Pezzotti
26. Clarissa Schönecker
27. Vaseem Akram Shaik
28. Kostas Soldatos
29. Saverio Spagnolie
30. David Stein
31. Daniel Tam
32. Juan David Torrenegra-Rico
33. Rahil Valani
34. Kirsty Wan
35. Joh Willis
36. Lailai Zhu
37. Pablo Zurita

Scientific report

Despite the linearity of the Stokes equations, nonlinearity is prevalent at zero Reynolds number due to the presence of interfaces, elastic structures and polymers, chemical concentrations, and electric fields, all of which have ramifications across many industrial and biological processes. In recent years, especially with the development of new experimental techniques for exploring microscale physics, there has been significant interest in understanding and categorising how these sources of nonlinearity interact with the long-ranged, configuration dependent, and non-local flows present at zero Reynolds number. In fact, instabilities that arise as a result of these mechanisms are responsible for important phenomena such as inertia-free mixing and transport in microscale devices, spontaneous force-free motion of colloidal particles and droplets, the generation of intra- and extracellular flow fields in organisms, as well as curious turbulence-like phenomena exhibited by active suspensions.

The focus of this colloquium was on nonlinearities that arise in the absence of inertia due to couplings with elastic structures and primarily elastic filaments, and coupling with chemical fields leading to phenomena such as phoretic motion. We aimed for our colloquium to attract and invite both theoreticians and experimentalists in these exciting and sometimes connected areas. An important dimension of the colloquium was to provide a forum of an exchange of techniques and methodologies (computational dynamical systems, asymptotic analysis, experimental and simulation techniques) between researchers on these different topics, as well as explore the commonalities and differences between the mechanisms of instabilities that are encountered.

Altogether there were 56 participants and 40 presentations. The full programme is available on the Colloquium's website. Most importantly, there was ample time for informal discussions among the participants during coffee breaks, lunches and social activities.

HERE SCIENTIFIC REPORT ABOUT WHAT HAS BEEN DISCUSSED/ADRESSED

We thank Euromech, Imperial College, and the other funding sources, for making the meeting possible and for financial and organizational support.

Number of participants from each country

COUNTRY	PARTICIPANTS
United Kingdom	31
France	9
Germany	5
Netherlands	4
Italy	3
Spain	3
Poland	2
Austria	2
United States	2
Estonia	1
Canada	1
Singapore	1
TOTAL	64