Chapter 1

oomph-lib related Publications

Here is a list of publications resulting from (or produced with) `oomph-lib`. If you have produced any work with `oomph-lib` and would like it to be listed here, send us a URL (or an electronic version of the publication) and we will install a link to it.

- Diekmann, Jan, and Uwe Thiele. “Mesoscopic hydrodynamic model for spreading, sliding, and coarsening compound drops”. Physical Review Fluids 10 (2025): 024002. https://doi.org/10.1103/physrevfluids.10.024002.
- Hartmann, Simon, and Uwe Thiele. “Gradient dynamics model for drops of volatile liquid on a porous substrate”. Physical Review Fluids 10 (2025): 014003. https://doi.org/10.1103/physrevfluids.10.014003.
- Pietz, Anthony, Karin John, and Uwe Thiele. “The role of substrate mechanics in osmotic biofilm spreading”. Soft Matter 21 (2025): 2935–2945. https://doi.org/10.1039/d4sm01463d.
- Voss, Florian, and Uwe Thiele. “Chemo-mechanical motility modes of partially wetting liquid droplets” (2025). https://doi.org/10.48550/ARXIV.2504.03297.
- Zeugin, T., Keuchel, P., Morón, D., Coulter, F. B., Halic, M. M. N., Heil, M., Avila, M., & Holzner, M. (2025). Fluid structure interaction in pulsatile flow through an elastic pipe segment. Physical Review Fluids, 10(7), Article 073101. https://doi.org/10.1103/ymqr-dbsw
- Fontana, J. V., Cuttle, C., Pihler-Puzovic, D., Hazel, A. L. & Juel, A. (2024) Peeling fingers in an elastic Hele-Shaw channel. *Journal of Fluid Mechanics* **985** DOI: 10.1017/jfm.2024.210
- Lawless, J., Keeler, J., Hazel, A. L. & Juel, A. (2024) Stable bubble formations in a depth-perturbed Hele-Shaw channel *Physical Review Fluids* **9**, 093605. DOI: 10.1103/physrevfluids.9.093605
- Miara, T., Vaquero-Stainer, C., Pihler-Puzovic, D., Heil, M., & Juel, A. (2024). Dynamics of inertialess sedimentation of a rigid U-shaped disk. Communications physics, 7(47). https://doi.org/10.1038/s42005-024-01537-5
- Vaquero-Stainer, C., Miara, T., Juel, A., Pihler-Puzovic, D., & Heil, M. (2024). U-shaped disks in Stokes flow: Chiral sedimentation of a non-chiral particle. Journal of Fluid Mechanics, 999. https://doi.org/10.1017/jfm.2024.923
- Diekmann, Jan, and Uwe Thiele. “Drops of volatile binary mixtures on brush-covered substrates”. The European Physical Journal Special Topics 233 (2024): 1615–1624. https://doi.org/10.1140/epjs/s11734-024-01169-4.
- Hartmann, Simon, et al. “Drops on Polymer Brushes: Advances in Thin-Film Modeling of Adaptive Substrates”. Langmuir 40 (2024): 4001–4021. https://doi.org/10.1021/acs.langmuir.3c03313.

- Voss, Florian, and Uwe Thiele. "Gradient dynamics approach to reactive thin-film hydrodynamics". Journal of Engineering Mathematics 149 (2024). https://doi.org/10.1007/s10665-024-10402-x.
- Deblais, A., Xie, K., Lewin-Jones, P., Aarts, D., Herrada, M. A., Eggers, J., Sprittles, J. E., & Bonn, D. (2025). Early stages of drop coalescence. Physical Review Fluids, 10(4), L042001. https://doi.org/10.1103/PhysRevFluids.10.L042001
- Lewin-Jones, P., Lockerby, D. A., & Sprittles, J. E. (2024). Collision of liquid drops: Bounce or merge? Journal of Fluid Mechanics, 995, A1. https://doi.org/10.1017/jfm.2024.722
- Sprittles, J. E. (2024). Gas Microfilms in Droplet Dynamics: When Do Drops Bounce? Annual Review of Fluid Mechanics, 56(1), 91–118. https://doi.org/10.1146/annurev-fluid-121021-021121
- Diddens, C. & Rocha, D. (2024). Bifurcation tracking on moving meshes and with consideration of azimuthal symmetry breaking instabilities. Journal of Computational Physics 518, 113306. https://doi.org/10.1016/j.jcp.2024.113306

  This paper provides a detailed description of pyoomph, *"...an object-oriented multi-physics finite element framework for Python. It is mainly a custom high level frontend for the prime functionalities of the powerful C++ library oomph-lib..."* (quote from their webpage). They maintain their own, impressively long list of publications (35 at the time of writing this (August 2025)) that involved the use of pyoomph or its predecessor codes.
- Maretvadakethope, S., Hazel, A. L., Vasiev, B. & Bearon, R. N. (2023) The interplay between bulk flow and boundary conditions on the distribution of micro-swimmers in channel flow. *Journal of Fluid Mechanics* **976**, A13. DOI: 10.1017/jfm.2023.897
- Smith, K., Retallick, A., Melendrez Armada, D., Vijayaraghavan, A., & Heil, M. (2023). Modelling graphene-polymer heterostructure MEMS membranes with the Föppl–von Kármán equations. ACS Applied Materials and Interfaces . https://doi.org/10.1021/acsami.2c21096
- Li, H., Retallick, A., Juel, A., Heil, M., & Pihler-Puzovic, D. (2023). Swelling-induced Patterning in Soft Microchannels. Soft Matter. https://doi.org/10.1039/D3SM01008B
- Cheng, H., Luding, S. & Weinhart, T. (2023), CG-enriched concurrent multi-scale modeling of dynamic surface interactions between discrete particles and solid continua. Acta Mechanica Sinica, 39(1). Article 722218. https://doi.org/10.1007/s10409-022-22218-x
- Cheng, H., Thornton, A. R., Luding, S., Hazel, A. L. & Weinhart, T. (2023), Concurrent multi-scale modeling of granular materials: Role of coarse-graining in FEM-DEM coupling. Computer methods in applied mechanics and engineering, 403 (Part A). Article 115651. https://doi.org/10.1016/j.cma.2022.115651
- Greve, Daniel, Simon Hartmann, and Uwe Thiele. "Stick-slip dynamics in the forced wetting of polymer brushes". Soft Matter 19 (2023): 4041–4061. https://doi.org/10.1039/d3sm00104k.
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- Mitas, Kevin David Joachim, Ofer Manor, and Uwe Thiele. “Bifurcation study for a surface-acoustic-wave-driven meniscus”. Physical Review Fluids 6 (2021): 094002. https://doi.org/10.↩ 1103/physrevfluids.6.094002.

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  The computations shown in this paper were performed in the days before oomph-lib, but the problem considered in this study now features in oomph-lib demo problems:

  - Flow in a 2D channel with an oscillating wall.
  - Flow in a 2D collapsible channel.

1.1 PDF file

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