

## Molecular Model Database of the Boltzmann–Zuse Society for Computational Molecular Engineering

Simon Stephan,<sup>1</sup> Martin Thomas Horsch,<sup>2</sup> Jadran Vrabec,<sup>3</sup> and Hans Hasse<sup>1</sup>

<sup>1</sup> Technische Universität Kaiserslautern, Laboratory of Engineering Thermodynamics, Erwin-Schrödinger-Str. 44, 67663 Kaiserslautern, Germany

<sup>2</sup> UK Research and Innovation, STFC Daresbury Laboratory, Keckwick Ln, Daresbury, Cheshire WA4 4AD, United Kingdom

<sup>3</sup> Technische Universität Berlin, Thermodynamics and Process Engineering, Ernst-Reuter-Platz 1, 10587 Berlin, Germany

simon.stephan@mv.uni-kl.de, martin.horsch@stfc.ac.uk

The openly accessible molecular model database (MolMod DB) of the Boltzmann–Zuse Society for Computational Molecular Engineering contains materials relations (force fields) for over 150 low-molecular fluids, meant for molecular modelling and simulation with molecular dynamics (MD) and Monte Carlo (MC) solvers [1].

The molecular models in the database have been published in about 30 articles over the past 20 years, which are associated with the respective entries and can be followed on the MolMod DB web front end. The database provides a wide range of search functionalities, e.g., for substances (names and CAS numbers) and model classes. Input files for several common environments can be downloaded via the web front end, including the file formats used by the molecular simulation codes ms2 [2], GROMACS [3], LAMMPS [4], and ls1 mardyn [5].

### Acknowledgements

The co-authors from Berlin and Kaiserslautern acknowledge funding from the German Federal Ministry for Education and Research (BMBF) under grant no. 01IH16008, *Task-basierte Lastverteilung und Auto-Tuning in der Partikelsimulation (TaLPas)*, the co-author from Daresbury acknowledges funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement no. 760907, *Virtual Materials Marketplace (VIMMP)*, and the co-authors from Kaiserslautern acknowledge funding from the German Research Foundation (DFG) within the Reinhart Koselleck Programme and from the European Union’s Horizon 2020 research and innovation programme under grant agreement no. 694807, *Enrichment of Components at Interfaces and Mass Transfer in Fluid Separation Technologies (ENRICO)*.

### References

- Stephan, S., Horsch, M., Vrabec, J., and Hasse, H.: MolMod – an open access database of force fields for molecular simulations of fluids. *Molecular Simulation* **45** (10), 806–814 (2019).
- Rutkai, G., Köster, A., Guevara Carrión, G., Janzen, T., Schappals, M., Glass, C. W., Bernreuther, M., Wafai, A., Stephan, S., Kohns, M., Reiser, S., Deublein, S., Horsch, M., Hasse, H., and Vrabec, J.: ms2 – a molecular simulation tool for thermodynamic properties, release 3.0. *Computer Physics Communications* **221**, 343–351 (2017).

4. Abraham, M., Murtola, T., Schulz, R., Szilárd, P., Smith, J., Hess, B., and Lindahl, E.: GROMACS – High performance molecular simulations through multi-level parallelism from laptops to supercomputers. *SoftwareX* 1–2, 19–25 (2015).
5. Plimpton, S.: Fast parallel algorithms for short-range molecular dynamics. *Journal of Computational Physics* **117** (1), 1–19 (1995).
6. Niethammer, C., Becker, S., Bernreuther, M., Buchholz, M., Eckhardt, W., Heinecke, A., Werth, S., Bungartz, H.-J., Glass, C. W., Hasse, H., Vrabec, J., and Horsch, M.: ls1 mardyn – The massively parallel molecular dynamics code for large systems. *Journal of Chemical Theory and Computation* **10** (10), 4455–4464 (2014).