Document Summaries (Ordered by Date: Oldest to Newest)

# 1. TechRep\_2004-02.pdf

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| --- | --- |
| Author(s) | Thomas Pohl et al. |
| Publication Date | February 2005 |
| Summary | Evaluates the parallel performance of large-scale LBM applications on various supercomputing architectures. Emphasizes the importance of efficient CPUs and high-speed communication for optimal LBM performance. |

# 2. TechRep\_2005-07.pdf

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| --- | --- |
| Author(s) | Gerhard Wellein et al. |
| Publication Date | July 2005 |
| Summary | Explores adaptive parameterization for free surface flows using LBM, with emphasis on Smagorinsky turbulence modeling and adaptive timesteps. |

# 3. wellein2006.pdf

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| --- | --- |
| Author(s) | Gerhard Wellein et al. |
| Publication Date | 2006 |
| Summary | Studies how data layout and architecture-specific optimizations affect single-processor performance of LBM kernels. Finds that vector systems can significantly outperform standard CPUs. |

# 4. Faisal\_MT\_2006.pdf

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| --- | --- |
| Author(s) | Faisal et al. |
| Publication Date | 2006 |
| Summary | A master’s thesis on data transfer between non-matching meshes in multiphysics simulations using radial basis functions and isoparametric mapping. |

# 5. TechRep\_2008-01.pdf

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| --- | --- |
| Author(s) | Unknown |
| Publication Date | 2008 |
| Summary | Provides foundational work in data structures or algorithm design for LBM or multibody dynamics. |

# 6. TechRep\_2009-08.pdf

|  |  |
| --- | --- |
| Author(s) | Unknown |
| Publication Date | 2009 |
| Summary | Technical report likely on performance tuning or simulation studies in LBM or rigid body simulations. |

# 7. TechRep\_2009-10.pdf

|  |  |
| --- | --- |
| Author(s) | U. Rüde et al. |
| Publication Date | 2009 |
| Summary | Introduces compile-time assertions to enforce type and interface consistency in C++ physics engine code for simulations. |

# 8. TechRep\_2009-11.pdf

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| --- | --- |
| Author(s) | U. Rüde et al. |
| Publication Date | 2009 |
| Summary | Covers internal software engineering strategies used in waLBerla, possibly introducing custom data containers. |

# 9. TechRep\_2009-18.pdf

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| Author(s) | U. Rüde et al. |
| Publication Date | 2009 |
| Summary | Introduces the Sandwich Pattern—a hybrid compile-time and runtime polymorphism design pattern used in the physics engine. |

# 10. TechRep\_2009-19.pdf

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| --- | --- |
| Author(s) | U. Rüde et al. |
| Publication Date | 2009 |
| Summary | Explains setup and parallelization strategy of large-scale rigid multibody simulations using the pe physics engine. |

# 11. TechRep\_2010-03.pdf

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| --- | --- |
| Author(s) | U. Rüde et al. |
| Publication Date | 2010 |
| Summary | Likely discusses performance strategies or a module addition to waLBerla or the physics engine in simulation environments. |

# 12. TechRep\_2010-07.pdf

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| --- | --- |
| Author(s) | Christian Feichtinger et al. |
| Publication Date | 2010 |
| Summary | Presents a performance model and GPU acceleration of LBM within waLBerla, using CPU-GPU heterogeneous nodes. |

# 13. Gotz2010.pdf

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| Author(s) | Jan Götz et al. |
| Publication Date | 2010 |
| Summary | Describes a coupled LBM and rigid-body physics simulation framework that scales to 8192 cores. Demonstrates application in particle-laden flows. |

# 14. Schornbaum\_DA\_2010.pdf

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| Author(s) | Florian Schornbaum |
| Publication Date | 2010 |
| Summary | Diploma thesis on impulse-based rigid body collision response, including shared memory parallelization and stability analysis. |

# 15. feichtinger2011.pdf

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| --- | --- |
| Author(s) | Christian Feichtinger et al. |
| Publication Date | 2011 |
| Summary | Presents the WaLBerla framework for high-performance multiphysics simulations, focusing on modularity, scalability, and hybrid CPU-GPU execution. |

# 16. Rauh\_BT\_2013.pdf

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| Author(s) | Matthias Rauh |
| Publication Date | 2013 |
| Summary | Bachelor thesis on accurate LBM treatment of moving boundaries using triangulated surfaces, improving over bounce-back methods. |

# 17. Rettinger\_BT\_2013.pdf

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| Author(s) | Christoph Rettinger |
| Publication Date | 2013 |
| Summary | Bachelor thesis evaluating BGK, TRT, and MRT collision models in LBM, including parameter selection and benchmark testing. |

# 18. popa2014.pdf

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| --- | --- |
| Author(s) | Constantin Popa et al. |
| Publication Date | 2014 |
| Summary | Introduces regularized solution methods for linear complementarity problems (LCPs) with application to multibody dynamics. Proposes iterative solvers and analyzes their convergence behavior. |

# 19. Schornbaum\_Paris\_SIAM-PP\_2016-04-15.pdf

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| --- | --- |
| Author(s) | Florian Schornbaum |
| Publication Date | 2016 |
| Summary | Presentation on adaptive LBM mesh refinement and block-based domain partitioning for extreme-scale supercomputing. |

# 20. Diss\_2017-Fattahi.pdf

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| Author(s) | Ehsan Fattahi |
| Publication Date | 2017 |
| Summary | PhD dissertation (summary unavailable in search result) related to LBM or coupled physics simulations in waLBerla. |

# 21. Diss\_2018-Schornbaum.pdf

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| Author(s) | Florian Schornbaum |
| Publication Date | 2018 |
| Summary | PhD thesis on adaptive mesh refinement (AMR) for extreme-scale LBM simulations using distributed block-based partitioning. |

# 22. vsc-18-cpr-v1.pdf

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| Author(s) | Ulrich Rüde |
| Publication Date | 2018 |
| Summary | Presentation of waLBerla applications in 3D LBM simulations for additive manufacturing and validation against industrial test cases. |

# 23. Krieg\_BT\_2019.pdf

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| Author(s) | Benedikt Krieg |
| Publication Date | 2019 |
| Summary | Bachelor thesis analyzing grid refinement strategies in LBM and validating results against known solutions like Couette flow. |

# 24. Holzer\_MT\_2020.pdf

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| Author(s) | Markus Holzer |
| Publication Date | 2020 |
| Summary | Master’s thesis focused on LBM simulation performance with complex geometries, advanced collision models, and GPU integration. |

# 25. Schwarzmeier\_PASC\_2021.pdf

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| Author(s) | Christoph Schwarzmeier |
| Publication Date | 2021 |
| Summary | Poster on LBM-based DNS simulations through porous media using waLBerla with validation against turbulence models. |