Publications

Dmitry A. Fedosov

Key facts

Publications: **69** peer-reviewed articles, **15** conference proceedings, and **10** book chapters

Total citations: **3288** from Web of Science, **5094** from Google Scholar (10.01.22)

H-index: **33** from Web of Science, **37** from Google Scholar (10.01.22)

Under review

1. A. Darras, A. K. Dasanna, T. John, G. Gompper, L. Kaestner, D. A. Fedosov, and C. Wagner, "Erythrocyte sedimentation: fracture and collapse of a high-volume-fraction soft-colloid gel", *arXiv*, arXiv:2108.13841, 2021.
2. A. K. Dasanna, A. Darras, T. John, G. Gompper, L. Kaestner, C. Wagner, and D. A. Fedosov, "Erythrocyte sedimentation: effect of aggregation energy on gel structure during collapse", *arXiv*, arXiv:2108.13848, 2021.

Peer-reviewed articles

1. A. K. Dasanna, S. Hillringhaus, G. Gompper, and D. A. Fedosov, "Effect of malaria parasite shape on its alignment at erythrocyte membrane", *eLife*, **10**, e68818, 2021.
2. A. Rabe, A. Kihm, A. Darras, K. Peikert, G. Simionato, A. K. Dasanna, H. Glaß, J. Geisel, S. Quint, A. Danek, C. Wagner, D. A. Fedosov, A. Hermann, and L. Kaestner, "The erythrocyte sedimentation rate and its relation to cell shape and rigidity of red blood cells from Chorea-acanthocytosis patients in an off-label treatment with Dasatinib", *Biomolecules*, **11**, 727, 2021.
3. A. K. Dasanna, J. Mauer, G. Gompper, and D. A. Fedosov, "Importance of viscosity contrast for the motion of erythrocytes in microcapillaries", *Frontiers in Physics*, **9**, 666913, 2021.
4. C. Mo and D. A. Fedosov, "Competing effects of inertia, sheet elasticity, fluid compressibility and viscoelasticity on the synchronization of two actuated sheets", *Physics of Fluids*, **33**, 043109, 2021.
5. A. Darras, K. Peikert, A. Rabe, F. Yaya, G. Simionato, T. John, A. K. Dasanna, S. Buvalyy, J. Geisel, A. Hermann, D. A. Fedosov, A. Danek, C. Wagner, and L. Kaestner, "Acanthocyte sedimentation rate as a diagnostic biomarker for neuroacanthocytosis syndromes: experimental evidence and physical justification", *Cells*, **10**, 788, 2021.

6. W. Chien, G. Gompper, and D. A. Fedosov, "Effect of cytosol viscosity on the flow behavior of red blood cell suspensions in microvessels", *Microcirculation*, **28**, e12668, 2021.
7. A. K. Dasanna, G. Gompper, and D. A. Fedosov, "Stability of heterogeneous parallel-bond adhesion clusters under load", *Physical Review Research*, **2**, 043063, 2020.
8. H. R. Vutukuri, M. Hoore, C. Abaurrea-Velasco, L. van Buren, A. Dutto, T. Auth, D. A. Fedosov, G. Gompper, and J. Vermant, "Active particles induce large shape deformations in giant lipid vesicles", *Nature*, **586**, 52-56, 2020.
9. A. Hochstetter, R. Vernekar, R. H. Austin, H. Becker, J. P. Beech, D. A. Fedosov, G. Gompper, S.-C. Kim, J. T. Smith, G. Stolovitzky, J. O. Tegenfeldt, B. H. Wunsch, K. K. Zeming, T. Krüger, and D. W. Inglis, "Deterministic lateral displacement: challenges and perspectives", *ACS Nano*, **14**, 10784-10795, 2020.
10. S. Hillringhaus, A. K. Dasanna, G. Gompper, and D. A. Fedosov, "Stochastic bond dynamics facilitates alignment of malaria parasite at erythrocyte membrane upon invasion", *eLife*, **9**, e56500, 2020.
11. F. A. Soleymani, M. Ripoll, G. Gompper, and D. A. Fedosov, "Dissipative particle dynamics with energy conservation: isoenergetic integration and transport properties", *Journal of Chemical Physics*, **152**, 064112, 2020.
12. S. Hillringhaus, A. K. Dasanna, G. Gompper, and D. A. Fedosov, "Importance of erythrocyte deformability for the alignment of malaria parasite upon invasion", *Biophysical Journal*, **117**, 1202-1214, 2019.
13. W. Chien, Z. Zhang, G. Gompper, and D. A. Fedosov, "Deformation and dynamics of erythrocytes govern their traversal through microfluidic devices with a deterministic lateral displacement architecture", *Biomicrofluidics*, **13**, 044106, 2019.
14. S. H. Holm, Z. Zhang, J. P. Beech, G. Gompper, D. A. Fedosov, and J. O. Tegenfeldt, "Microfluidic particle sorting in concentrated erythrocyte suspensions", *Physical Review Applied*, **12**, 014051, 2019.
15. A. K. Dasanna, D. A. Fedosov, G. Gompper, and U. S. Schwarz, "State diagram for wall adhesion of red blood cells in shear flow: from crawling to flipping", *Soft Matter*, **15**, 5511-5520, 2019.
16. F. Reichel, J. Mauer, A. A. Nawaz, G. Gompper, J. Guck, and D. A. Fedosov, "High-throughput microfluidic characterization of erythrocyte shapes and mechanical variability", *Biophysical Journal*, **117**, 14-24, 2019.
17. Z. Zhang, W. Chien, E. Henry, D. A. Fedosov, and G. Gompper, "Sharp-edged geometric obstacles in microfluidics promote deformability-based sorting of cells", *Physical Review Fluids*, **4**, 024201, 2019.
18. J. Mauer, S. Mendez, L. Lanotte, F. Nicoud, M. Abkarian, G. Gompper, and D. A. Fedosov, "Flow-induced transitions of red blood cell shapes under shear", *Physical Review Letters*, **121**, 118103, 2018.

19. M. Cooley, A. Sarode, M. Hoore, D. A. Fedosov, S. Mitragotri, and A. Sen Gupta, "Influence of particle size and shape on their margination and wall-adhesion: implications in drug delivery vehicle design across nano-to-micro scale", *Nanoscale*, **10**, 15350-15364, 2018.

20. M. Hoore, F. Yaya, T. Podgorski, C. Wagner, G. Gompper, and D. A. Fedosov, "Effect of spectrin network elasticity on the shapes of erythrocyte doublets", *Soft Matter*, **14**, 6278-6289, 2018.

21. D. A. Fedosov, "Hemostasis is a highly multiscale process: Comment on 'Modelling thrombosis in silico: frontiers, challenges, unresolved problems and milestones' by A. V. Belyaev et al.", *Physics of Life Reviews*, **26-27**, 108-109, 2018.

22. M. Hoore, K. Rack, D. A. Fedosov, and G. Gompper, "Flow-induced adhesion of shear-activated polymers to a substrate", *Journal of Physics: Condensed Matter*, **30**, 064001, 2018.

23. D. Alizadehrad and D. A. Fedosov, "Static and dynamic properties of smoothed dissipative particle dynamics", *Journal of Computational Physics*, **356**, 303-318, 2018.

24. K. Rack, V. Huck, M. Hoore, D. A. Fedosov, S. W. Schneider, and G. Gompper, "Margination and stretching of von Willebrand factor in the blood stream enable adhesion", *Scientific Reports*, **7**, 14278, 2017.

25. B. Huisman, M. Hoore, G. Gompper, and D. A. Fedosov, "Modeling the cleavage of von Willebrand factor by ADAMTS13 protease in shear flow", *Medical Engineering & Physics*, **48**, 14-22, 2017.

26. J. Mauer, M. Peltomäki, S. Poblete, G. Gompper, and D. A. Fedosov, "Static and dynamic light scattering by red blood cells: a numerical study", *PLoS ONE*, **12**, e0176799, 2017.

27. L. Lanotte, J. Mauer, S. Mendez, D. A. Fedosov, J.-M. Fromental, V. Claveria, F. Nicoud, G. Gompper, and M. Abkarian, "Red cells' dynamic morphologies govern blood shear thinning under microcirculatory flow conditions", *Proceedings of the National Academy of Sciences USA*, **113**, 13289-13294, 2016.

28. E. Henry, S. H. Holm, Z. Zhang, J. P. Beech, J. O. Tegenfeldt, D. A. Fedosov, and G. Gompper, "Sorting cells by their dynamical properties", *Scientific Reports*, **6**, 34375, 2016.

29. H. Turlier, D. A. Fedosov, B. Audoly, T. Auth, N. S. Gov, C. Sykes, J.-F. Joanny, G. Gompper, and T. Betz, "Equilibrium physics breakdown reveals the active nature of red blood cell membrane fluctuations", *Nature Physics*, **12**, 513-519, 2016.

30. G. Gompper and D. A. Fedosov, "Modeling microcirculatory blood flow: current state and future perspectives", *WIREs Systems Biology and Medicine*, **8**, 157-168, 2016.

31. K. Müller, D. A. Fedosov, and G. Gompper, "Understanding particle margination in blood flow - a step toward optimized drug delivery systems", *Medical Engineering & Physics*, **38**, 2-10, 2016.

32. Z. Zhang, E. Henry, G. Gompper, and D. A. Fedosov, "Behavior of rigid and deformable particles in deterministic lateral displacement devices with different post shapes", *Journal of Chemical Physics*, **143**, 243145, 2015.

33. D. A. Fedosov, A. Sengupta, and G. Gompper, "Effect of fluid-colloid interactions on the mobility of a thermophoretic microswimmer in non-ideal fluids", *Soft Matter*, **11**, 6703-6715, 2015.

34. D. A. Fedosov, "In silico modeling of malaria and sickle-cell disease", *Drug Discovery Today: Disease Models*, **16**, 17-22, 2015.

35. D. Katanov, G. Gompper, and D. A. Fedosov, "Microvascular blood flow resistance: role of red blood cell migration and dispersion", *Microvascular Research*, **99**, 57-66, 2015.

36. F. Römer and D. A. Fedosov, "Dense brushes of stiff polymers or filaments in fluid flow", *Europhysics Letters*, **109**, 68001, 2015.

37. K. Müller, D. A. Fedosov, and G. Gompper, "Smoothed dissipative particle dynamics with angular momentum conservation", *Journal of Computational Physics*, **281**, 301-315, 2015.

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39. K. Müller, D. A. Fedosov, and G. Gompper, "Margination of micro- and nano-particles in blood flow and its effect on drug delivery", *Scientific Reports*, **4**, 4871, 2014.

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43. D. A. Fedosov, H. Noguchi, and G. Gompper, "Multiscale modeling of blood flow: from single cells to blood rheology", *Biomechanics and Modeling in Mechanobiology*, **13**, 239-258, 2014.

44. R. G. Winkler, S. P. Singh, C.-C. Huang, D. A. Fedosov, K. Mussawisade, A. Chatterji, M. Ripoll, and G. Gompper, "Mesoscale hydrodynamics simulations of particle suspensions under shear flow: From hard to ultrasoft colloids", *European Physical Journal-Special Topics*, **222**, 2773-2786, 2013.

45. X. Shi, G. Lin, J.-F. Zou, and D. A. Fedosov, "A lattice Boltzmann fictitious domain method for modeling red blood cell deformation and multiple-cell hydrodynamic interactions in flow", *International Journal for Numerical Methods in Fluids*, **72**, 895-911,

2013.

46. L. Grinberg, D. A. Fedosov, and G. E. Karniadakis, "Parallel multiscale simulations of a brain aneurysm", *Journal of Computational Physics*, **244**, 131-147, 2013.

47. H. Lei, D. A. Fedosov, B. Caswell, and G. E. Karniadakis, "Blood flow in small tubes: quantifying the transition to the non-continuum regime", *Journal of Fluid Mechanics*, **722**, 214-239, 2013.

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49. S. P. Singh, D. A. Fedosov, A. Chatterji, R. G. Winkler, and G. Gompper, "Conformational and dynamical properties of ultra-soft colloids in semi-dilute solutions under shear flow", *Journal of Physics: Condensed Matter*, **24**, 464103, 2012.

50. D. A. Fedosov, S. P. Singh, A. Chatterji, R. G. Winkler, and G. Gompper, "Semi-dilute solutions of ultra-soft colloids under shear flow", *Soft matter*, **8**, 4109-4120, 2012.

51. D. A. Fedosov, J. Fornleitner, and G. Gompper, "Margination of white blood cells in microcapillary flow", *Physical Review Letters*, **108**, 028104, 2012.

52. L. Grinberg, V. Morozov, D. A. Fedosov, J. A. Insley, M. E. Papka, K. Kumaran, and G. E. Karniadakis, "A new computational paradigm in multiscale simulations: Application to brain blood flow", refereed article in *Proceedings of the 2011 ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis, SC'11*, accepted as a finalist for the Gordon Bell award, 2011.

53. D. A. Fedosov, H. Lei, B. Caswell, S. Suresh, and G. E. Karniadakis, "Multiscale modeling of red blood cell mechanics and blood flow in malaria", *PLoS Computational Biology*, **7**, e1002270, 2011.

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59. D. A. Fedosov, B. Caswell, A. S. Popel, and G. E. Karniadakis, "Blood flow and cell-free layer in microvessels", *Microcirculation*, **17**, 615-628, 2010.
60. D. A. Fedosov, B. Caswell, and G. E. Karniadakis, "A multiscale red blood cell model with accurate mechanics, rheology, and dynamics", *Biophysical Journal*, **98**, 2215-2225, 2010.
61. D. A. Fedosov, B. Caswell, and G. E. Karniadakis, "Systematic coarse-graining of spectrin-level red blood cell models", *Computer Methods in Applied Mechanics and Engineering*, **199**, 1937-1948, 2010.
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63. D. A. Fedosov and G. E. Karniadakis, "Triple-decker: Interfacing atomistic-mesoscopic-continuum flow regimes", *Journal of Computational Physics*, **228**, 1157-1171, 2009.
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69. T. Ozawa, D. A. Fedosov, D. A. Levin, and S. F. Gimelshein, "Quasi-classical trajectory modeling of OH production in direct simulation Monte Carlo", *Journal of Thermophysics and Heat Transfer*, **19**, 235-244, 2005.

Book chapters

1. A. K. Dasanna, U. S. Schwarz, G. Gompper, and D.A. Fedosov, "Multiscale modeling of malaria-infected red blood cells", in *Handbook of Materials Modeling. Applications: Current and Emerging Materials* edited by W. Andreoni and S. Yip, Springer Nature, New York, USA, 2018.
2. J. Elgeti, D. A. Fedosov, and G. Gompper, "Introduction: Physics of Life", *lecture manuscript of the 49th IFF Spring School "Physics of Life"* organized by G. Gompper, J. K. G. Dhont, J. Elgeti, C. Fahlke, D. A. Fedosov, S. Förster, P. Lettinga, and A. Offenhäusser, Jülich, Germany, 2018.

3. D. A. Fedosov, "Modeling blood flow and primary hemostasis in microcirculation", *lecture manuscript of the 49th IFF Spring School "Physics of Life"* organized by G. Gompper, J. K. G. Dhont, J. Elgeti, C. Fahlke, D. A. Fedosov, S. Förster, P. Lettinga, and A. Offenhäusser, Jülich, Germany, 2018.
4. T. Auth, D. A. Fedosov, and G. Gompper, "Simulating Membranes, Vesicles, and Cells", in *The Giant Vesicle Book* edited by R. Dimova and C. Marques, CRC Press, Boca Raton, FL, 2018.
5. D. A. Fedosov, K. Müller, and G. Gompper, "Smoothed dissipative particle dynamics - a mesoscopic particle-based hydrodynamic technique for complex fluids", *lecture manuscript of the Jülich School on Computational Trends in Solvation and Transport in Liquids* organized by J. Grotendorst, G. Sutmann, G. Gompper, and D. Marx, Jülich, Germany, 2015.
6. D. A. Fedosov, K. Müller, and G. Gompper, "Drug delivery in blood", *lecture manuscript of the 46th IFF Spring School on Functional Soft Matter* organized by J. K. G. Dhont, G. Gompper, G. Meier, D. Richter, G. Vliegenthart, and R. Zorn, Jülich, Germany, 2015.
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Patents

1. S. Suresh, G. E. Karniadakis, B. Caswell, I. V. Pivkin, D. A. Fedosov, D. J. Quinn, and M. Dao, "Computational methods and compositions", patent numbers: WO2011119492-A2, US2011287948-A1, US2011289043-A1, US2011293558-A1, US2012064505-A1, WO2011119492-A3.

Conference proceedings

1. K. Müller, D. A. Fedosov, and G. Gompper, "Margination of micro- and nano-particles in blood flow and its effect on drug delivery", *Proceedings of the 4th International*

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2. D. A. Fedosov, J. Fornleitner, J. L. McWhirter, K. Müller, H. Nogichi, M. Peltomäki, and G. Gompper, "Blood flow in silico: from single cells to blood rheology", *Proceedings of the 4th Micro and Nano Flows Conference*, London, England, 2014.

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11. D. A. Fedosov, S. V. Rogazinsky, M. I. Zeifman, M. S. Ivanov, A. A. Alexeenko, and D. A. Levin, "Analysis of numerical errors in the DSMC method", *Proceedings of the Rarefied Gas Dynamics: 24th International Symposium on Rarefied Gas Dynamics, AIP Conference Proceedings*, **762**, 589-594, 2005.

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13. T. Ozawa, D. A. Fedosov, D. A. Levin, and S. F. Gimelshein, "Use of quasi-classical

trajectory methods in the modeling of OH production mechanisms in DSMC", AIAA Paper 2004-0336, *42nd AIAA Aerospace Sciences Meeting*, 2004.

14. A. A. Alexeenko, D. A. Levin, D. A. Fedosov, S. F. Gimelshein, and R. J. Collins, "Coupled thermal-fluid modeling of micronozzles for performance analysis", AIAA Paper 2003-4717, *39th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit*, 2003.
15. A. A. Alexeenko, D. A. Levin, D. A. Fedosov, S., F. Gimelshein, and R. J. Collins, "Coupled thermal-fluid analyses of microthruster flows", AIAA Paper 2003-0673, *41st Aerospace Sciences Meeting and Exhibit*, 2003.

Theses

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2. D. A. Fedosov, PhD thesis "Multiscale Modeling of Blood Flow and Soft Matter", Division of Applied Mathematics, Brown University, USA, 2010.
3. D. A. Fedosov, Master thesis "Investigation of Numerical Errors in Direct Simulation Monte Carlo", Department of Aerospace Engineering, Pennsylvania State University, USA, 2004.