

Stefan Metzger
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Office of Human Resources
Illinois Institute of Technology
10 West 35th Street
Chicago, IL 60616

Dear Hiring Committee:

with this letter I am applying for a postdoc position at the Department of Applied Mathematics at the Illinois Institute of Technology. I finished my Ph.D. in applied mathematics at the Friedrich–Alexander University of Erlangen–Nuremberg (Germany) in 2017. During my research visit with Professor Chun Liu (chair of the Department of Applied Mathematics) in March 2018, we discussed a possibility for future collaboration and he encouraged me to apply.

My research interests are mathematical modeling, analysis and numerical simulation in fluid mechanics, in particular two-phase flows, electrolyte solutions, and micro-macro-models for complex fluids. Currently, I am working on model development and simulation of two-phase flow in porous media. These topics fit perfectly for the Department of Applied Mathematics. For example, the core subject of my Ph.D. thesis, which is modeling, analysis and numerical treatment of two-phase flow of electrolyte or dilute polymeric solutions, is within the research interests of Professor Chun Liu. In addition, I see possible collaboration with Associate Professor Shuwang Li, who is working on multicomponent flows.

During my Ph.D. studies, I also gained teaching experience by preparing assignments and solutions for diverse lectures, giving tutorial lectures and programming courses, and supervising teaching assistants.

I think my research interests and teaching experience fit well to the Department of Applied Mathematics. The postdoc position at the IIT will give me an excellent chance to extend my expertise on modeling and analysis of complex flows and to collaborate with renown researchers.

For further information, please feel free to contact me at anytime.

Yours sincerely

Stefan Metzger

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Ph.D. in Mathematics

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Work experience and distinctions

- 2019–2021 **GAMM junior.**
- since 10/2018 **Staedler-Promotionspreis.**
- since 08/2018 **Research associate**, *Illionois Institute of Technology, Chicago*,
USA, Department of Applied Mathematics, Group of Prof. Chun Liu.
- 2017–2018 **Research associate**, *Friedrich–Alexander University of Erlangen–Nuremberg*,
Germany, Chair of Applied Mathematics I.
- 2013–2017 **Research associate**, *Friedrich–Alexander University of Erlangen–Nuremberg*,
Germany, Group of Prof. Dr. Günther Grün.
- 2011–2013 **Research assistant**, *Friedrich–Alexander University of Erlangen–Nuremberg*,
Germany, Group of Prof. Dr. Günther Grün.

Education

- 06/2013–
02/2017 **Ph.D. in Mathematics**, *Friedrich–Alexander University Erlangen–Nuremberg*,
Germany, *Grade* ‘summa cum laude’.
Ph.D. thesis: ‘Diffuse interface models for complex flow scenarios: Modeling, analysis, and simulation’
(Supervisor: Prof. Dr. Günther Grün; additional referees: Prof. Dr. Eberhard Bänsch, Prof. Dr. Thomas Richter)
- 10/2011–
05/2013 **M.Sc. Mathematics**, *Friedrich–Alexander University of Erlangen–Nuremberg*,
Germany, *Grade* 1.0.
Master’s thesis: ‘Diffuse interface models for transport processes at fluidic interfaces: Modeling and simulation’ (in German)
(Supervisor: Prof. Dr. Günther Grün)
- 10/2008–
9/2011 **B.Sc. Technomathematics**, *Friedrich–Alexander University of Erlangen–Nuremberg*,
Germany, *Grade* 1.3.
Bachelor’s thesis: ‘Hyperelastic limiting process of the Cosserat rod to a generalized string and regularized numerical schemes for low Mach numbers’ (in German)
(Supervisor: Prof. Dr. Nicole Marheineke)
- 2007–2008 Compulsory civilian service
- 2007 **Abitur** (general qualification for university entrance), *Naturwissenschaftlich-technologisches und Sprachliches Gymnasium (secondary school)*, Feuchtwangen (Germany), *Grade* 1.0.

Projects

- 2011–2017 Participation in the **Priority Program 'SPP1506: Transport Processes at Fluidic Interfaces'**, funded by the German Research Foundation DFG.
- Modeling, analysis, and simulation of dilute polymeric solutions
 - Supervision of the C++ software project **EconDrop**

Computer skills

Software	Matlab, Paraview
Programming languages	C++, Java
Miscellaneous	LaTeX

Conference and Workshop Talks

- 2018 **'Upscaling two-phase flow in porous media including droplet topology'**, *Computational Methods In Water Resources XXII*, Saint-Malo (France).
- 2017 **'On a convergent, decoupled splitting scheme for DIMs for two-phase flow with general mass densities'**, *International Conference on Elliptic and Parabolic Problems*, Gaeta (Italy).
- 'Complex transport processes at fluidic interfaces – numerical simulations based on thermodynamically consistent models'**, *Workshop: Dynamics of Interfaces in Complex Fluids and Complex Flows*, Erlangen (Germany).
- 2016 **'On micro-macro models for two-phase flow with dilute polymeric solutions'**, *4th Workshop of the GAMM Activity Group on Analysis of Partial Differential Equations*, Dortmund (Germany).
- 'On stable splitting schemes for phase-field models with ion transport'**, *11th AIMS Conference on Dynamical Systems, Differential Equations and Applications*, Orlando (USA).
- 2015 **'Simulation of ion induced fluid motion and droplet break-up'**, *Joint International Conference and Autumn School*, Darmstadt (Germany).
- 'On numerical schemes for phase-field models for electrowetting with electrolyte solutions'**, *GAMM 86th Annual Scientific Conference*, Lecce (Italy).
- 2014 **'On a convergent, decoupled splitting scheme for DIMs for two-phase flow with general mass densities'**, *2nd International Conference on Numerical Methods in Multiphase Flows*, Darmstadt (Germany).
- 2013 **'Diffuse interface models for transport processes on fluidic interfaces'**, *ITN-Springschool: Optimization in PDE, Reaction-diffusion Systems and Phase-field Models*, Saint Raphael (France).

Posters

- 2014 **'On a convergent, decoupled splitting scheme for DIMs for two-phase flow with general mass densities'**, *International Conference: Modeling, Analysis and Computing in Nonlinear PDEs*, Liblice (Czech Republic).

Publications

- [1] S. Metzger, *On convergent schemes for two-phase flow of dilute polymeric solutions*, ESAIM: Mathematical Modelling and Numerical Analysis (2018), published online first.
- [2] S. Metzger, *On stable, dissipation reducing splitting schemes for two-phase flow of electrolyte solutions*, Numerical Algorithms (2018), published online first, DOI 10.1007/s11075-018-0530-2.
- [3] H. Abels, H. Garcke, G. Grün, and S. Metzger, *Diffuse interface models for incompressible two-phase flows with different densities*, In Advances in Mathematical Fluid Mechanics (2017), DOI 978-3-319-56602-3_8.
- [4] G. Grün and S. Metzger, *Micro-macro-models for two-phase flow of dilute polymeric solutions: Macroscopic limit, analysis, and numerics*, In Advances in Mathematical Fluid Mechanics (2017), DOI 978-3-319-56602-3_12.
- [5] G. Grün, F. Guillén-González, and S. Metzger, *On fully decoupled, convergent schemes for diffuse interface models for two-phase flow with general mass densities*, Communications in Computational Physics **19** (2016), no. 5, 1473–1502, DOI:10.4208/cicp.scpde14.39s.
- [6] G. Grün and S. Metzger, *On micro-macro-models for two-phase flow with dilute polymeric solutions – modeling and analysis*, Mathematical Models and Methods in Applied Sciences **26** (2016), no. 05, 823–866, DOI: 10.1142/S0218202516500196.
- [7] S. Metzger, *On numerical schemes for phase-field models for electrowetting with electrolyte solutions*, Proceedings in Applied Mathematics and Mechanics **15** (2015), no. 1, 715–718, DOI: 10.1002/pamm.201510346.