Mohsen Karimi

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SUMMARY STATEMENT

Researcher in Computational Fluid Dynamics with a passion for turbulent multiphase systems and programming. Over ten years of experience developing and applying CFD models for a wide range of problems in chemical and process engineering fields.

EDUCATION

Process Engineering Department,
University of Stellenbosch — Stellenbosch, South Africa
Ph.D. in Extractive Metallurgical Engineering — *March 2014*
Dissertation: "CFD Analysis of Solid-Liquid-Gas Interactions in Flotation Vessels"
Advisors: Guven Akdogan, Steven M. Bradshaw

Faculty of Mining and Metallurgical Engineering,
Yazd University — Yazd, Iran
M. Sc. in Mineral Processing — *October 2009*
Thesis: "CFD Modelling and Evaluating the Effects of Operational Parameters on the Performance of Hydrocyclones"
Advisors: Ali Dehghani, Shahram Talebi

Faculty of Mining Engineering,
Kashan University — Kashan, Iran
B. Sc.in Mining Engineering — *June 2006*

PROFESSIONAL EXPERIENCE

Postdoctoral Researcher — **2017 - Present**
Department of Chemistry and Chemical Engineering
Chalmers University of Technology

Working with Professor Andersson on developing models for dispersed multiphase flows. The project aims to improve the understanding of droplets and gas bubbles breakup in turbulent flows by developing new kernels for population balance modeling.

Postdoctoral Researcher — **2014 - 2017**
Department of Applied Science and Technology
Polytechnic University of Turin

Worked with Professor Marchisio on "Modelling of Morphology Development of Micro and Nano Structures, (MoDeNa)" project. Developed a new solver, `PUFoam`, in OpenFOAM based on coupling of PBE with CFD for simulation of reacting expanding polyurethane foams.

PUBLICATIONS

REFEREED JOURNAL PAPERS

1. M. Karimi, D. L. Marchisio, E. Laurini, M. Fermeglia, S. Pricl, "Bridging the gap across scales: Coupling CFD and MD/GCMC in polyurethane foam simulation", *Chemical Engineering Science*, Vol. 178, pp. 39–47, 2018.
2. M. Karimi, H. Droghetti, D. L. Marchisio, "PUFoam: a novel open-source CFD solver for the simulation of expanding and reacting polyurethane foams", *Computer Physics Communications*, Vol. 217, pp. 138–148, 2017.
3. P. Ferkl, M. Karimi, D. L. Marchisio, J. Kosek, "Multi-scale modelling of expanding polyurethane foams: coupling macro- and bubble-scales", *Chemical Engineering Science*, Vol. 148, pp. 55–64, 2016.
4. M. Karimi, H. Droghetti, D. L. Marchisio, "Multiscale Modelling of Expanding Polyurethane Foams via Computational Fluid Dynamics and Population Balance Equation", *Macromolecular Symposia*, Vol. 360(1), pp. 108–122, 2016.
5. M. Karimi, D. L. Marchisio, "A Baseline Model for the Simulation of Polyurethane Foams via the Population Balance Equation", *Macromolecular Theory and Simulations*, Vol. 24(4), pp. 291–300, 2015.
6. M. Karimi, G. Akdogan, S. M. Bradshaw, "A Computational Fluid Dynamics Model for the Flotation Rate Constant, Part I: Model Development", *Minerals Engineering*, Vol. 69, pp. 214–222, 2014.
7. M. Karimi, G. Akdogan, S. M. Bradshaw, "A CFD-Kinetic Model for the Flotation Rate Constant, Part II: Model Validation", *Minerals Engineering*, Vol. 69, pp. 205–213, 2014.
8. M. Karimi, G. Akdogan, K. H. Dellimore, S. M. Bradshaw, "Quantification of Numerical Uncertainty in Computational Fluid Dynamics Modelling of Hydrocyclones", *Computer & Chemical Engineering*, Vol. 43, pp. 45–54, 2012.
9. M. Karimi, G. Akdogan, S. M. Bradshaw, "Effects of Different Mesh Schemes and Turbulence Models in CFD Modelling of Stirred Tanks", *Physicochemical Problems of Mineral Processing*, Vol. 48(2), pp. 513–531, 2012.
10. A. Ghaffari, M. Karimi, "Numerical Investigation on Multiphase Flow Simulation in a Centrifugal Flotation Cell", *International Journal of Coal Preparation and Utilization*, Vol. 32(3), pp. 120–129, 2012.
11. M. Karimi, G. Akdogan, A. Dehghani, S. M. Bradshaw, "Selection of Suitable Turbulence Models for Numerical Modelling of Hydrocyclones", *Chemical Product and Process Modelling*, Vol. 6(1), 2011.
12. M. Karimi, A. Dehghani, A. Nezamalhosseini, S. Talebi, "Prediction of Hydrocyclone Performance Using Artificial Neural Networks", *The Journal of South African Institute of Mining and Metallurgy*, Vol. 110, pp. 207–212, 2010.

CONFERENCE PROCEEDINGS

13. M. Karimi, P. Ferkl, D. L. Marchisio, J. Kosek, H. Droghetti, "Coupling of a macro-scale CFD model with a bubble-scale model for simulation of polyurethane foams", *In: Proceedings of the 22^{nd} International Congress of Chemical and Process Engineering, CHISA*, Prague, Czech Republic, August 28-31, 2016.
14. M. Karimi, D. L. Marchisio, "Coupling Population Balance Equation (PBE) with Computational Fluid Dynamics (CFD) for Multiphase Modelling of Expanding Polyurethane Foams", *In: Proceedings of the 9^{th} International Conference on Multiphase Flow*, Firenze, Italy, May 22-27, 2016.
15. P. Ferkl, M. Karimi, D. L. Marchisio, J. Kosek, "Introducing a Multiscale modelling tool for the Simulation of Polyurethane Foams", *In: Proceedings of the 9^{th} International Conference on Multiphase Flow*, Firenze, Italy, May 22-27, 2016.
16. M. Karimi, D. L. Marchisio, "Validation of a Macro-Scale CFD-PBE Model for the Polyurethane Foaming Process", *In: Proceedings of the AIChE 2015 Annual Meeting*, Salt Lake City, UT, USA, November 8-13, 2015.
17. M. Karimi, G. Akdogan, S. M. Bradshaw, "A CFD Model for the Flotation Rate Constant", *In: Proceedings of the 37^{th} International Symposium Application of Computers and Operations Research in the Mineral Industry (APCOM)*, pp. 445-456, May 23-27, 2015.

18. M. Karimi, D. L. Marchisio, "Multi-scale Modelling of a Reacting-Expanding Polyurethane Foam", *10th European Congress of Chemical Engineering*, Nice, France, September 27 to October 1, 2015.
19. M. Karimi, D. L. Marchisio, "Multiscale Modelling of Expanding Polyurethane Foams via Computational Fluid Dynamics and Population Balance Model", *In: Proceedings of Polymer Reaction Engineering IX (PRE9),* Cancun, Mexico, May 10-15, 2015.
20. M. Karimi, G. Akdogan, K. Dellimore, S. M. Bradshaw, "Comparison of Different Drag Coefficients in CFD Modelling of a Laboratory Scale Rushton-Turbine Flotation Tank", *In: Proceedings of the Ninth International Conference on CFD in the Minerals and Process Industries*, CSIRO, Melbourne, Australia, December 10-12, 2012.
21. M. Karimi, G. Akdogan, K. Dellimore, S. M. Bradshaw, "Quantification of Numerical and Model Uncertainties in the CFD Simulation of the Gas Holdup and Flow Dynamics in a Laboratory Scale Rushton-turbine Flotation Tank", *In: Proceedings of the Ninth International Conference on CFD in the Minerals and Process Industries*, CSIRO, Melbourne, Australia, December 10-12, 2012.
22. M. Karimi, G. Akdogan, S. M. Bradshaw, A. Mainza, "Numerical Modelling of Air Core in Hydrocyclones", *In: Proceedings of the Ninth International Conference on CFD in the Minerals and Process Industries*, CSIRO, Melbourne, Australia, December 10-12, 2012.

PROFESSIONAL DEVELOPMENT

- Advanced workshop on multi-scale modelling of flowing soft matter and polymer systems, International Center for Mechanical Science (CISM), Udine, Italy, July 2016.

- OpenFOAM: Programming CFD, Training workshop, CFD Direct Limited, April 2016.

- *MoDeNa* technical workshop on the quantum, molecular and meso-scale modelling, University of Stuttgart, Stuttgart, Germany, Feb 2015.

- *MoDeNa* technical workshop on the production of polyurethane foams, Lemförde, Germany, Feb 2014.

- Grant Writing Workshop, Division for Research Development, Stellenbosch University, April 2012.

- A Strategic Plan and Approach for the Launching of a Successful Article to an Accredited Journal, Division for Research Development, Stellenbosch University, April 2012.

SKILLS

Pre-processing: Proficient in Design Modeller and GAMBIT, familiar with SALOME and Blender.

CFD codes: Proficient in OpenFOAM and Fluent.

Post-processing: Proficient in CFD-Post and ParaView.

Programming: Proficient in C++ and MATLAB, experienced with Python.

Design of Experiments: Proficient in Design Expert, MiniTab, Qualitek.

Mineral processing tools: Experienced with MODSIM, familiar with JKSimMet.

REFERENCES

- Ronnie Andersson (ronnie.andersson@chalmers.se), Associate Professor, Department of Chemistry and Chemical Engineering, Chalmers University of Technology, Gothenburg, Sweden.

- Daniele L. Marchisio (daniele.marchisio@polito.it), Professor, Department of Applied Science and Technology, Politecnico di Torino, Turin, Italy.

- Guven Akdogan (gakdogan@sun.ac.za), Associate Professor, Department of Process Engineering, Stellenbosch University, Stellenbosch, South Africa.