



**MENWER ATTARAKIH**



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## PROF. OF COMPUTER-AIDED PROCESS ENGINEERING

2005-Present

- Guest Professor of Computer-Aided Process Engineering/ The University of Kaiserslautern/ Germany.
- Spent regular Research Visits (three months each) at the Institute of Process Engineering/University of Kaiserslautern/ Germany and Fraunhofer Institute for Industrial Mathematics during the summer of 2005 until 2016.
- Inventor & Developer of **PPBLab** software for modeling, simulation and design of liquid-liquid extraction columns.
- Inventor of **SQMOM (US Patent 20100106467)**, OPOSPM, **MSQMOM**, **CQMOM** & **NQMOM** for discrete modelling of particulate systems.
- Honored with the selection as a Testimonial in the Postgraduate & Doctoral Education by the International School for Graduate Studies (ISGS) at the University of Kaiserslautern/ Germany, 2008.
- Named as top 10 percent reviewer in Chemical Engineering at Publons/September, 2016.
- Member of the editorial board of the of Journal of Applied Engineering Science & Technology at the University of Mohamed Khider de Biskra/Algeria.
- Selected as a Committee member for Evaluating the best PhD Thesis in Chemical Engineering for Tiburtius Prize at the Universities of Berlin/ Germany, 2010.
- Appointed at Fraunhofer Institute for Industrial Mathematics/ Transport processes group/ Kaiserslautern/ Germany in 2009, Declined.
- Appointed as Associate Prof. at the University Technology Malaysia/ Faculty of Chemical & Natural Resources Engineering in 2008, Declined.
- Having long experience in modelling discrete phase systems using the Population Balance Equation.
- Verified Reviewer for the Chemical Engineering Science, Journal of Computational Physics, Computers & Chemical Engineering Journal, Journal of Cleaner Production, the Chemical Engineering Research and Design Journals, and many more.
- Participated in many advanced workshops on teaching process design and advanced Computer-Aided Process Modelling.
- Vice dean of school of Engineering for Quality affairs & Accreditation/University of Jordan.



## EDUCATION

- **January 2001 – June 2004:** The University of Kaiserslautern, Faculty of Mechanical and Process Engineering/ Institute of Process Engineering/ Kaiserslautern-Germany:
  - Doctor of Engineering Science /Chemical Engineering/ with Distinction grade/Excellent (Auszeichnung).
  - Thesis: Solution Methodologies for the Population Balance Equations Describing the Hydrodynamics of Liquid-liquid Extraction Contactors. Cooperation with Prof. Markus Kraft (Cambridge University/ UK), URL: <http://kluedo.ub.uni-kl.de/volltexte/2004/1746>
- **1995-1997:** The University of Jordan/ Amman-Jordan:
  - M.Sc. in Chemical Engineering.
  - Cumulative average: 3.96/4, Rating: Excellent.
  - Thesis: Dynamic Modelling of Packed Bed Glycerol-Water Distillation Column.
  - The thesis is based on modelling industrial scale plant and is published in the Ind. Eng. Chem. Res., 40, 4857-4865, URL: <http://pubs.acs.org/doi/abs/10.1021/ie000430y>.
- **1986-1988:** Jordan University of Science and Technology/ Chemical Engineering Dept./ Irbid-Jordan:
  - The first two years of chemical engineering course work (Rating: Very Good, Ranking: the third).
- **1988-1993:** The University of Jordan/ Amman-Jordan: B.Sc. in Chemical Engineering (Rating: Good).

## INDUSTRIAL AND RESEARCH COLLABORATION

- Having strong research cooperation with:
  - Institute of Process Engineering/ University of Kaiserslautern/ Germany.
  - Department of Applied Mathematics/ University of Kaiserslautern/ Germany.
  - Fraunhofer Institute of Industrial Mathematics/ Transport & Computational Fluid Dynamics Group
  - LARGHYDE Laboratory /University of Biskra/ Algeria.
- Having strong research collaboration with the international chemical industries:
  - BASF the chemical company/ Germany.
  - NOVARTIS pharmaceutical company/Switzerland.
  - EDL-Poerner Company for Plant Engineering/ Germany.
  - TENOVA/ Germany.
  - Chemstations Europe GmbH/Germany.
- Having a special five-year experience in erection, start-up and operation of oil splitting, fatty acids and glycerin processes.
- Head of Glycerin distillation plants for five years at the Jordan Industrial Resources Company, 1994-1998, Amman/Jordan.

## DEVELOPED SOFTWARE

- Developed **PPBLAB** software, which is used now by EDL-Poerner Company (<http://www.edl.poerner.de/en.html>) and the University of Kaiserslautern.
- Developed **LLECMOD** software, which is used by BASF company/ Germany and the University of Kaiserslautern/ Germany.
- Inventor of the **SQMOM** and the **MSQMOM** for discrete modelling of particulate systems.
- Developer of the Differential Maximum Entropy Method for solving Integral Population Balances.
- Developer of the **CQMOM**, which recently solved the Moment Problem in Population Balances.
- Developer of the **NQMOM**: A stable population balance solver, which is coupled to **FPM software** (Fraunhofer Institute for Industrial Mathematics).
- Developed SIMULINK-MATLAB module for dynamic modelling and control of gas absorption columns.
- Developed Differential models for the dynamic simulation of gas adsorption using MATLAB/University of Kaiserslautern/Germany.
- Developed many steady state and dynamic flowsheet models using COCO free simulator and the commercial simulator CHEMCAD which include multicomponent glycerin distillation plants, chlorine drying, Drying oil, CO<sub>2</sub> removal from natural gas, butyl acetate process, reactive dimethyl ether process, mono chlorobenzene process and many more.
- Developed of **OPOSPM**: A reduced Population Balance Model for modelling Two-phase flow systems with particular coupling to CFD software:
  - FLUENT: CFD Simulation of RDC and Kuhni Extraction columns .
  - FPM: CFD simulation of RDC Extraction column.
  - OPENFOAM: CFD simulation of RDC and Kuhni Extraction columns.
  - COMSOL: Two-Fluid Model of Bubbly flow in vertical Tubes.
  - SIMULINK-MATLAB: Steady state and Dynamic Modelling of Kühni liquid Extraction Column.

## ACADEMIC RANKS

- Professor of Computer-Aided Process Engineering at The University of Jordan in Amman, 11 September 2014- present.
- Associate professor of Computer-Aided Process Engineering at The University of Jordan in Amman, 11 September 2011- 11 September 2014.
- Associate professor of chemical engineering, Al-Balqa Applied University, February 2010 – 11 September 2011.
- Assistant professor of chemical engineering, Al-Balqa Applied University, November 2004 - February 2010.
- Lecturer in chemical engineering, Al-Balqa Applied University, Sep. 1998 – Sep. 2000.
- PhD Student / The University of Kaiserslautern/ Institute of Process Engineering/ / Germany: October 2000 - August 2004.
- Guest Professor/ The University of Kaiserslautern/ Institute of Process Engineering/ Germany during the summer (three months) of 2005-2016.

### ACADEMIC EXPERIENCE

- Long experience in teaching: Process Design, Computer-Aided Process Design, Chemical Plant Design, Process Modelling and Simulation, Process Dynamics & Control, Process Optimization, Applied Numerical Methods in Chemical Engineering, Industrial mathematics and Water Chemistry (at bachelor and master levels).
- Frequent reviewer for the Celebrated Chemical Engineering Science Journal, Chemical Engineering Research and Design Journal, Computers & Chemical Engineering Journal and Many International Conferences (Population balance conferences, CFD for process industries, IChEAP ....).
- Member of the editorial board of Journal of Applied Engineering Science & Technology at Université Mohamed Khider de Biskra.
- Participated in developing and improving undergraduate and graduate chemical engineering curricula.
- Head of ABET committee at the Chemical Engineering Department/University of Jordan, 20014-2016 during which I established the ABET working system and brought six-year accreditation to the ChE department.
- Supervised, numerous undergraduate projects, master and doctoral level thesis at the University of Jordan/Amman and University of Kaiserslautern/Germany.

### INDUSTRIAL EXPERIENCE & COLLABORATION

- Prof. Attarakih has an active projects in modelling, troubleshooting, debottlenecking, design and operation with many leading international oil and petrochemical companies which include:
- EDL Company in Leiptzeg/ Germany (<http://www.edl.poerner.de/en.html>).
- LANXESS/ Germany (<http://lanxess.com/en/corporate/home/>).
- SULZER Company/ Germany (<http://www.sulzer.com/en/>).
- BASF/ Germany (<http://www.basf.com/group/corporate/en/>).
- NOVARTIS/ Switzerland (<http://www.novartis.com/>).
- Prof. Attarakih Conducted many courses in Process modelling & Simulation, Process Retrofitting & Energy Integration.
- Participated in many of International Symposia and Chemical Process Industrial Conferences, which include the famous symposium: ESCAPE (European Symposium on Computer-Aided Process Engineering).
- As a Prof. of Computer-aided process design, Attarakih conducted many computer-aided design projects including gas & oil industries, vegetable oil refineries and in biochemical engineering.
- Long experience in erection, start-up and operation of chemical process plants including oil splitting, fatty acids and glycerin distillation processes.
- ProcessBuilder workshop – Advanced Process Modelling and Flowsheeting, held by the PSE The Advanced Modelling Company in Grand Hotel Bernardin/ Slovenia and organized by ESCAPE26, 15 June 2016.

### INDUSTRIAL EXPERIENCE & COLLABORATION

- Workshop on Teaching Product and Process Design, held at the National University of Singapore by the organizers of the 11<sup>th</sup> International Symposium on Process Systems Engineering (PSE2012). The workshop was given by the editor of the Computers and Chemical Engineering Journal (Prof. Rafiq Al ghani), Prof. Warren Seider & Soemantri Widagdo, 3M Co., 20 July-2012.
- Chemical and Process Engineer/ high pressure oil and fat splitting, fatty acids & glycerin distillation: June 1993 - September 1998.
- Certified internal auditor (ISO 9000 quality management system): December 1995 - August 1998.
- Course in internal quality auditing from quality college of Scotland (a course held in Jordan, 1996).
- Training course on improved productivity through method study. organized by industrial extension services project (UNDP).
- Training course on introduction to materials management. organized by industrial extension services project (UNDP).
- Training course on supervisory skills. organized by industrial extension services project (UNDP).
  - Training course on production short term scheduling tactics. organized by industrial extension services project (UNDP).

### HONORS & AWARDS

- 2005-2016: Awarded a full gest Professor research stays at the Chair of Separation Sciences & Technology/ The University of Kaiserslautern/ Germany.
- 2016: Best short & poster presentation award in ICOME16 (Int. National Conference on Materials & Energy/ Larochelle University/ France) .
- 2016: Named as top 10 percent reviewer in Chemical Engineering at Publons/September, 2016.
- 2016: Awarded as an OUTSTANDING REVIEWER by the Editors of the Journal of Computational Physics published by Elsevier for his major contribution to the quality of the Journal.
- 2015: Awarded the OUTSTANDING REVIEWER Award from the Editors of the Chemical Engineering Science Journal published by Elsevier for his major contribution to the quality of the Journal.
- 2015: Invited as a keynote speaker by BCI (Bio-und Chemieingenieurwissenschaften/Verfahrenstechnik), University of Kaiserslautern/Germany, June, 03.
- 2014: Invited as keynote speaker/Advanced course on Population Balance Modelling and Design of Liquid-Liquid Extraction columns by the International Solvent Extraction 2014 (ISEC2014) conference/Wuertzburg/Germany, September, 7-11, 2014.
- 2014: Awarded one year extraordinary time for full professorship promotion by the University of Jordan due to achieving 42 points with minimum University requirements of 12 points.
- 2013: The Award of the Most Downloaded Authors for the Computers & Chemical Engineering Journal.

## HONORS & AWARDS

- 2013, 2015, 2016: The first Award of Chemical Process Design Graduation project among the Jordanian Universities, which offered by the Jordan Engineering Association.
- 2005-2016: Awarded a full guest Professor research stays at the Chair of Separation Sciences & Technology/ The University of Kaiserslautern/ Germany.
- 2011: Invited as a lead speaker on coupling population balances to CFD codes, CFD2011 conference, Trondheim/ Norway, 21 – 24 June 2011.
- 2010: Selected as a Committee member for Evaluating the best PhD Thesis in Chemical Engineering for Tiburtius Prize at the Universities of Berlin/ Germany.
- 2008: Honored with the selection as a Testimonial in the Postgraduate & Doctoral Education by the International School for Graduate Studies (ISGS) at the University of Kaiserslautern/ Germany.
- 2008: The University of Technology Malaysia (UTM)/ Faculty of Chemical and Natural Resources Engineering / Process Design Group, promoted me to Associate Professor rank in Chemical Engineering. UTM ranks the first in the ten-top Malaysian Universities for science & technology.
- 2008: My article Process intensification with reactive extraction columns appeared as the 17th in the top of the 25th hottest articles in the Chemical Engineering And Processing Journal.
- 2006: My article LLECMOD: A windows-based program for hydrodynamics simulation of liquid-liquid extraction columns appeared as the 13th in the top of the 25th hottest articles in the Chemical Engineering And Processing Journal.
- 2004: My article (coauthored with Faqir, M.): Optimal temperature policy for immobilized enzyme packed bed reactor performing reversible Michaelis-Menten kinetics using the disjoint policy. *Biotechnology and Bioengineering*, 77, 163-173, was selected as the best practical research by the University of Jordan/ Amman-Jordan.
- 2000: Awarded a full five-year Grant by Al-Balqa Applied University to get my PhD in Chemical Engineering/University of Kaiserslautern/Germany.

## CONFRENCES & WORKSHOPS

- Participated in more than 50 peer reviewed International Symposia and Conferences on Computer-Aided Process Engineering, CFD, Industrial Mathematics & Solvent Extraction (see the details on the last pages).
- Conducted an advanced course on Population Balance Modelling and Design of Liquid-Liquid Extraction columns by the International Solvent Extraction 2014 (ISEC2014) conference/Wuertzburg/Germany, September, 7-11, 2014.
- Conducted two workshops on coupling population balances to CFD software/ Fraunhofer Institute for Industrial Mathematics/ Germany: October 2010 & January 2011.
- Participated in ProcessBuilder workshop – Advanced Process Modelling and Flowsheeting, held by the PSE The Advanced Modelling Company in Grand Hotel Bernardin/ Slovenia and organized by ESCAPE26, 15 June 2016.

### CONFERENCES & WORKSHOPS

- Participated in Workshop on Teaching Product and Process Design, held at the National University of Singapore by the organizers of the 11<sup>th</sup> International Symposium on Process Systems Engineering (PSE2012). The workshop was given by the editor of the Computers and Chemical Engineering Journal (Prof. Rafiq Al ghani), Prof. Warren Seider & Soemantri Widagdo, 3M Co., 20 July-2012.
- Participated Computer-Aided Chemical Engineering Course: Consists of advanced case studies selected from chemical engineering which were solved using ASPEN PLUSE, CEMCAD, MATHCAD, ChemSep, MATLAB and Fluent. It was a two-month course held by the Institute of Process Engineering/ University of Kaiserslautern/Germany, 2001.
- Participated in Interne Arbeitssitzung der GVC-Fachhausschuesse "Mischvorgaenge" und "Computational Fluid Dynamics", (2003), Berlin, Germany.

### INTERNATIONAL SYMPOSIA & CONFERENCES

1. 26<sup>th</sup> European Symposium on Computer-Aided Process Engineering (ESCAPE26), June 12-15, 2016, Bernardin Congress Center, Slovenia.
2. International Conference on Materials & Energy (ICOM'16), May 17-20 May 2016, University of La Rochelle, La Rochelle, France.
3. 22<sup>nd</sup> International Congress of Chemical and Process Engineering, CHISA 2016 Prague, Czech Republic, 28-31 August, 2016.
4. PSE 2015 & 25<sup>th</sup> European Symposium on Computer-Aided Process Engineering (ESCAPE25), May 31-June 04, 2015, Copenhagen, Denmark.
5. 10<sup>th</sup> European Congress on Chemical Engineering, 27 September - 01 August 2015, Nice, France
6. Jahrestreffen der Fachgruppen Extraktion und Mischvorgänge, 16.-17.03.2015, Heidelberg, Germany.
7. Mathematics in (Bio) Chemical Kinetics and Engineering MaCKiE, 02-03.07.2015, Ghent, Belgium.
8. 24<sup>th</sup> European Symposium on Computer-Aided Process Engineering (ESCAPE24), June 15-18, 2014, Budapest, Hungary.
9. 2<sup>nd</sup> International Symposium on Multiscale Multiphase Process Engineering, 24-27 September 2014, Hamburg, Germany.
10. 20<sup>th</sup> International Solvent Extraction Conference 2014, 7–11 September 2014, Würzburg, Germany.
11. 5<sup>th</sup> International Conference on Population Balance Modelling, Indian Institute of Science, Bangalore, India, September, 2013
12. 6<sup>th</sup> International Conference on Process System Engineering: PSE ASIA 2013, Kuala Lumpur, June, 2013.
13. 83<sup>rd</sup> Annual Scientific Conference of the International Association of Applied Mathematics and Mechanics, 26-30 March, 2012, Technische Universität Darmstadt, Germany.
14. Emulsification: Modeling, Technologies and Applications, 19-21 November 2012, Lyon, France.
15. CHISA: 20<sup>th</sup> International Congress of Chemical and Process Engineering, Prague, Czech Republic, 2012
16. The 11<sup>th</sup> International Symposium on Process System Engineering, 15-19 July, 2012, Singapore.

**INTERNATIONAL SYMPOSIA & CONFERENCES**

17. The European Symposium on Computer Aided Process Engineering-22, (2012), University College London, London.
18. Workshop Mulm and ReDrop, 22-23 September 2011, AVT - Thermische Verfahrenstechnik, RWTH Aachen University, Aachen, Germany
19. Aachen Conference on Computational Engineering Science ACCES, 13-15 July, 2011, Aachen, Germany.
20. Treffen der Fachgruppen Extraktion und Phytoextrakte, 18-20 April 2012, Clausthal-Zellerfeld, Germany.
21. ProcessNet-Jahrestagung und 30. DECHEMA-Jahrestagung der Biotechnologen 2012, 10. - 13. September 2012, Kongresszentrum Karlsruhe.
22. 8<sup>th</sup> European Congress of Chemical Engineering, September 25 - 29, 2011, Berlin, Germany.
23. II International Conference on Particle-based Methods: Fundamentals and Applications, PARTICLES 2011, E. Onate and D.R.J. Owen (Eds), 26-28 October 2011, Barcelona/ Spain.
24. 8th International Conference on CFD in Oil & Gas, Metallurgical and Process Industries, SINTEF/NTNU, Trondheim Norway, 21-23 June 2011.
25. The European Symposium on Computer Aided Process Engineering-21, (2011), Chalkidiki, Greece.
26. The 16-th European Conference on Mathematics for Industry July 26-30, 2010 Wuppertal, Germany.
27. 4<sup>th</sup> International Conference on Population Balance Modelling (2010), Berlin, Germany.
28. European Symposium on Computer Aided Process Engineering-20, (2010), Ischia, Italy.
29. The European Symposium on Computer Aided Process Engineering-19, (2009), Cracow, Poland.
30. International Solvent Extraction Conference ISEC 2008. Tucson, Arizona, USA, 15-19 Sep. 2008.
31. 6th International Conference on CFD in Oil & Gas, Metallurgical and Process Industries, SINTEF/NTNU, Trondheim Norway, 10-12 June 2008.
32. The European Symposium on Computer Aided Process Engineering-18, (2008), Lyon, France.
33. Third International Conference on Population Balance Modelling, (2007), Quebec City, Canada.
34. The European Symposium on Computer Aided Process Engineering-16, (2006), Garmish-Partenkirchen, Germany.
35. The 8th Conference on Process Integration, Modeling and Optimization for Energy saving and Pollution Reduction, PRES' 05, Giardini di Naxos, Italy, May 15-18, 2005.
36. International Solvent Extraction Conference ISEC 2005, 19-23 Sep. 2005, Beijing, China.
37. The European Symposium on Computer Aided Process Engineering-15, (2005), Barcelona, Spain.
38. DECHEMA/GVC – Jahrestagungen (2004), Karlsruhe, Germany.
39. Second Int. Conf. on Population Balance Modelling, (2004) Valencia, Spain.
40. Interne Arbeitssitzung der GVC-Fachhausschuesse "Mischvorgaenge" und "Computational Fluid Dynamics", (2003), Berlin, Germany.



### INTERNATIONAL SYMPOSIA & CONFERENCES

41. The European Symposium on Computer Aided Process Engineering-14, (2003), Finland.
42. The European Symposium on Computer Aided Process Engineering-12, (2002), Den-Hag/ The Netherlands.

### REFERENCES

1. Prof. Dipl.-Ing. Dr. techn. Hans-Jörg Bart, The University of Kaiserslautern, Institute of Process Engineering, Kaiserslautern-Germany, Tel.: +49(0)631-205-2414, E-mail: [bart@mv.uni-kl.de](mailto:bart@mv.uni-kl.de) <http://www.uni-kl.de/wcms/tvt.html>
2. Dr. Jörg Kuhnert, Institut Techno- und Wirtschaftsmathematik, Fraunhofer-Platz, 67663 Kaiserslautern/ Germany, Telefax +49 (0) 6 31/3 16 00-10 99, E-mail: [kuhnert@itwm.fraunhofer.de](mailto:kuhnert@itwm.fraunhofer.de)
3. Dr. Sudarshan Tiwari, The University of Kaiserslautern, Department of Mathematics, Telefon: +49 (0)631 205 4133, E-mail: [Tiwari@mathematik.uni-kl.de](mailto:Tiwari@mathematik.uni-kl.de)

### PUBLICATIONS

1. M. Attarakih, A. Hasseine & H.-J. Bart (2017). On the Solution of the Population Balance Equation by Orthogonal Expansion of the Maximum Entropy Functional, Computer-Aided Chemical Process Engineering, Accepted.
2. M. Attarakih, S. Alzyod & A. Fricke (2017). Population Balance Modelling of pulsed packed bed extraction columns using PPBLab software, Computer-Aided Chemical Process Engineering, Accepted.
3. S. Alzyod, M. Attarakih & H.-J. Bart (2017). CFD Modelling of pulsed sieve plate liquid extraction columns using OPOSPM as a reduced population balance model, Computer-Aided Chemical Process Engineering, Accepted.
4. S. Alzyod, M. Attarakih, A. Hasseine & H.-J. Bart (2017). Steady state modeling of Kühni liquid extraction column using the Spatially Mixed Sectional Quadrature Method Of Moments (SM-SQMOM), Chem. Eng. Res. Design, 117C, 549-556.
5. M. Timedjehdine, A. Hasseine,\*, H. Binous, O. Bacha, M. Attarakih (2017). Liquid-liquid equilibrium data for water + acetic acid + solvent (dichloromethane + methyl isobutyl ketone) at T = 301.15 K, Desalination and Water Treatment, In press.
6. S. Alzyod, M. Attarakih & H.-J. Bart (2016). Dynamic modelling of Kühni liquid extraction columns using the sectional quadrature method of moments (SQMOM), Comp. Chem. Eng., 94, 331-342.
7. S. Alzyod, M. Attarakih & H.-J. Bart (2016). The Sectional Quadrature Method of Moments (SQMOM): An extension to nonhomogeneous bivariate population balances, Chem. Eng. Res. Design, 115, Part A, 195-203.
8. M. Attarakih, A. Hasseine & H.-J. Bart (2016). CFD Modelling of Bubbly Gas Flow using Coupled OPOSPM-Two-Fluid Model, Computer-Aided Chemical Engineering, 38, 403-408.
9. M. Attarakih & H.-J. Bart (2016). CFD Modelling of Bubbly Gas Flow using Coupled OPOSPM-Two-Fluid Model, 16<sup>th</sup> European Symposium on Computer-Aided Chemical Process Engineering (ESCAPE26), June 12-15, 2016, Bernardin Congress Center, Slovenia.

**PUBLICATIONS**

10. **M. Attarakih**, A. Hasseine & H.-J. Bart (2016). Modelling of an RDC extraction column using the differential maximum entropy method (DMaxEntM), Proceedings of International Conference on Materials & Energy (ICOM'16), 17-20 May 2016, La Rochelle, France.
11. S. Alzyod, **M. Attarakih**, H.-J. Bart, (2016), Detailed Modeling of an RDC liquid extraction column using the Sectional Quadrature Method Of Moments (SQMOM), proceedings of young researchers symposium (YRS), Fraunhofer verlag, Kaiserslautern, 9-14.
12. A. Hasseine, **M. Attarakih**, R. Belarabi and Bart H.-J. (2016). On The Semi-Analytical Solution of Integro-Partial Differential Equations, Proceedings of International Conference on Materials & Energy (ICOM'16), 17-20 May 2016, La Rochelle, France.
13. S. Alzyod, **M. Attarakih** & H.-J. Bart (2016) Population Balance Modelling of Liquid Extraction Columns using the Sectional Quadrature Method of Moments (SQMOM), *Computer-Aided Chemical Engineering*, 38, 427-432.
14. S. Alzyod, **M. Attarakih** & H.-J. Bart (2016) Population Balance Modelling of Liquid Extraction Columns using the Sectional Quadrature Method of Moments (SQMOM), 16<sup>th</sup> European Symposium on Computer-Aided Chemical Process Engineering (ESCAPE26), June 12-15, 2016, Bernardin Congress Center, Slovenia.
15. **M. Attarakih**, S. Alzyod & H.-J. Bart (2016). A new population balance module for pulsed sieve plate liquid extraction column using PPBLab software, 22<sup>nd</sup> International Congress of Chemical and Process Engineering, CHISA 2016 Prague, Czech Republic, 28-31 August, 2016.
16. **M. Attarakih**, S. Alzyod O. Aldmour, O. Markarian & H.-J. Bart (2016). Steady state modelling and parametric optimization of drying oil process using COCO as A CAPE-OPEN flowsheet simulator, 22<sup>nd</sup> International Congress of Chemical and Process Engineering, CHISA 2016 Prague, Czech Republic, 28-31 August, 2016.
17. **M. Attarakih**, S. Alzyod & H.-J. Bart (2016). Steady state modelling of a Kühni liquid extraction column using the Spatially Mixed-Sectional Quadrature Method Of Moments (SM-SQMOM), 22<sup>nd</sup> International Congress of Chemical and Process Engineering, CHISA 2016 Prague, Czech Republic, 28-31 August, 2016.
18. M. Timedjehdine, A. Hasseine, H. Binous, O. Bacha & **M. Attarakih** (2016). Liquid-liquid equilibrium data for water + formic acid + solvent (butyl acetate, ethyl acetate, and isoamyl alcohol) at  $t = 291.15$  k. *Fluid Phase Equilibria*, 415, 51-57.
19. O. Bacha, A. Hasseine & **M. Attarakih** (2016). Measurement and correlation of liquid-liquid equilibria for water + ethanol + mixed solvents (dichloromethane or chloroform + diethyl ether) at  $t = 293.15$  k. *Physics and Chemistry of Liquids*, 54, 1-13.
20. M. W Hlawitschka, **M. Attarakih**, S. Al-Zyod & H.-J. Bart (2015). CFD based extraction column design - Chances and challenges. *Chinese Journal of Chemical Engineering*, in press, [10.1016/j.cjche.2015.07.023](https://doi.org/10.1016/j.cjche.2015.07.023).
21. A. Hasseine, S. Senouci, **M. Attarakih**, & H. J. Bart (2015). Two analytical approaches for the solution of the population balance equations: Particle breakage process. *Chemical Engineering & Technology*, 38, 1574-1584.
22. **M. Attarakih**, Hasseine, A. and Bart, H.-J. (2015): A Meshfree Maximum Entropy Method for the Solution of the Population Balance Equation, *Computer-Aided Chemical Engineering*, 37, 197-202.
23. **M. Attarakih**, AlZyod, S. Hlawitschka, M. and Bart, H.-J. (2015): OPOSSIM: A population balance-SIMULINK module for modelling coupled hydrodynamics and mass transfer in liquid extraction equipment, *Computer-Aided Chemical Engineering*, 37, 257-262.

## PUBLICATIONS

24. **M. Attarakih**, AL-Slaihat, F., Hlawitschka, M. and Bart, H.-J. (2015): Modelling the hydrodynamics of bubble columns using coupled OPOSPM-maximum entropy method, *Computer-Aided Chemical Engineering*, 37, 203-208.
25. A. Hasseinea, Z. Barhouma, **M. Attarakih**, H.-J. Bart (2015). Analytical solutions of the particle breakage equation by the Adomian decomposition and the variational iteration methods, *Advanced Powder Technology*, 26, 105-12.
26. **M. Attarakih**, S. S. Al-Zyod, A. Hasseine and H.-J. Bart (2015). Population Balance Modelling of Pulsed Packed Bed Extraction Column using PPBLab, 10<sup>th</sup> European Congress on Chemical Engineering, 27 September - 01 August 2015, Nice, France, ISBN : 978-2-910239-82-4.
27. Alzyod S., **M. Attarakih**, Dutta A., Bart H.-J., (2015). The Sectional Quadrature Method Of Moments (SQMOM): An application to liquid-liquid extraction columns. *Mathematics in (Bio)Chemical Kinetics and Engineering MaCKiE*, 02-03.07.2015, Ghent, Belgium.
28. H. Jildeh, F. Gebauer, M. Mickler, **M. Attarakih**, H.-J. Bart (2015). Influence of inlet droplet size distribution on column hydrodynamics. *Jahrestreffen der Fachgruppen Extraktion und Mischvorgänge*, 16.-17.03.2015, Heidelberg, Germany.
29. **M. Attarakih & Bart, H.-J.** (2014). Solution of the population balance equation using the Differential Maximum Entropy Method (DMaxEntM): An Application to liquid extraction columns, *Chemical Engineering Science*, 108, 123-133.
30. **M. Attarakih & H.-J. Bart** (2014). A Novel MaxEnt Method for the Solution of Two-Dimensional Population Balance Equation with Particle Growth, *Computer-Aided Chemical Engineering*, 33, 901-906.
31. F. Gebauer, H. Jildeh, **M. Attarakih**, H.-J. Bart (2014). Coalescence behavior – from lab scale to pilot plant, *Proc. of 2nd International Symposium on Multiscale Multiphase Process Engineering*, Hamburg, Germany. CD only.
32. T. Waechtler, H. B. Jildeh, M. W. Hlawitschka, J. Kuhnert, **M. Attarakih**, A. Klar, H.-J. Bart (2014). A Meshfree Extraction Column FPM Simulation using the NQMOM-Population Balance Method, *Computers & Chemical Engineering Journal*, *Under review*.
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