

Name: Wojciech Tomasz Sołowski

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Address (work): Civil Engineering Department, Aalto University,  
Rakentajanaukio 4, Espoo, Finland

Education: PhD (Durham), MEng (Silesian University of Technology)

Languages: English (fluent), German (Zentrale Mittelstufe Prüfung, ZMP), French (B2/B1 level), basic Finnish, basic Russian

Research interests: Material point method (development, validation, use in geomechanics), constitutive modelling of soils, unsaturated soils – in particular in application for nuclear waste disposal sites, links between soil microstructure and its macroscopic behaviour, stress integration algorithms, computational algorithms

Other Interests: computers, technology, programming, artificial intelligence, economics, badminton, tennis, bridge, tai-chi.

Web : [https://people.aalto.fi/en/wojciech\\_solowski](https://people.aalto.fi/en/wojciech_solowski)  
<http://civil.aalto.fi/en/research/geoengineering/soil/>  
[http://civil.aalto.fi/fi/research/geoengineering/soil/numerical/thebes\\_project/](http://civil.aalto.fi/fi/research/geoengineering/soil/numerical/thebes_project/)



## Affiliations

2014 – current      Assistant Professor, Aalto University, Finland

2009 – 2014      Research Associate, University of Newcastle, Australia

2005 – 2008      Marie – Curie Early Stage Research Fellow, Durham University, UK. Research area: constitutive modelling of unsaturated soils, implementation of unsaturated soil models into Finite Element code, stress integration algorithms. Partially responsible for the MUSE project (see <http://muse.dur.ac.uk>) research at Durham University.

2005 – 2008      Ph.D student at Durham University, UK. Graduated in 2008, thesis: *Unsaturated Soils: constitutive modelling and explicit stress integration* prepared under supervision of Prof. R.S. Crouch and Dr D. Gallipoli.

2002 – 2005      Ph.D. student / Research Assistant, Silesian University of Technology, Gliwice, Poland, Faculty of Civil and Structure Engineering, Group of Geotechnics, supervised by Prof. zw. dr hab. inż. M. Gryczmański. The

studies have been suspended because of undertaking Marie-Curie Fellowship at Durham University.

### Awards

- 2003 Award for publication “Analysis of slab - column structure interaction with the ground.” at 2<sup>nd</sup> Young Geotechnics Conference, Szczyrk 2003, Poland
- 2002 Second grade prize in the XXXIIIth Prof. St. Brzozowski Competition for the best MSc project (organized by The Polish Association of Civil and Structure Engineers, branch Gliwice).
- 1997 – 2002 MSc Studies at Silesian University of Technology, Gliwice, Poland, Faculty of Civil and Structure Engineering. Specialisation: Computer Methods in Structure Mechanics (specialisation supervisor: Dr hab. inż. J. Skrzypczyk, Associate Professor). Honours graduated (thesis: ‘Analysis of slab - column structure interaction with the ground’, supervised by Prof. zw. dr hab. inż. M. Gryczmański)

### Funding Received

- 2015-2019 Finnish Academy project dealing with modelling of landslides with Generalized Interpolation Material Point Method. Total cost approximately 590,000 € from which the Finnish Academy funds approximately 413,000 € Project involves cooperation with Prof. Minna Karstunen from Chalmers University of Technology, Sweden.
- 2015 – 2018 THEBES project, funded by KYT2018 framework (Finnish Research Programme on Nuclear Waste Management). Total cost in 2015 is 418,000 € Aalto part is 126,000 € The currently scheduled funding for Aalto is 428,000 € over the 4 year period, though the budget may be cut each year. KYT2018 use full cost funding, meaning that 70% of the amount is funded by the program.  
Project involves 4 participants from Finland (Aalto University, Jyväskylä University, VTT and Numerola Oy), as well as number of international institutions with whom cooperation is likely (UPC BarcelonaTech, Ecole des Ponts ParisTech, Université de Pau et des pays de l'Adour, Georgia Institute of Technology & Texas A&M University)
- 2014 New Professor grant / tenure track grant (Aalto University internal grant).
- 2013 Granted 40,000 computing hours at National Computing Facility in Canberra (INTERSECT SCHEME). Grant title: “Application of the Material Point Method in solving geotechnical engineering problems”

## Teaching Experience

### Lecturing:

2016 onwards	Finite Element Method
2015 onwards	Numerical Methods in Geomechanics Rak-50.3150 (responsible teacher)
2014 onwards	Advanced Soil Mechanics Course Rak-50.3125 (responsible teacher from 2015)
2015 onwards	Geology & Geomechanics (single lecture)
2014 – 2015	European Mining Course (EMC), geotechnical part (~ 9h lectures, 3h exercises)

### Exercises:

2016 – onwards	Finite Element Method
2015 - current	Exercises for the Numerical Methods in Geomechanics course
2014-2015	Selected exercises in EMC course
2009 – 2011	Tutoring: CIVL 3280 Geomechanics II (group size 120+).
2009	Tutoring: CIVL 2280 Geomechanics I
2005 – 2007	Demonstrating: Light Mechanics Laboratory
2003 & 2005	Design exercises: Design of piles.
2002 – 2004	Design exercises: Design of foundation
2002 – 2005	Laboratory: ‘Soil Testing’. Two or three groups of students each year. Teaching shared with Dr K. Sternik and Dr M. Łupieżowiec.

## Pedagogical Training

Ongoing Aalto University pedagogical training including:

- 2015 – 2016            Teaching Practice (5cr)
- 2015                    Course Design (5cr)
- 2014 – 2015           Learning and Teaching in Higher Education (5cr)
- 2014                    A! Peda Intro Pedagogic course (5cr)

Silesian University of Technology Pedagogical Training:

- 2003 – 2004            Pedagogic course for academic teachers

## Research visits and research cooperation

- 2016 (ongoing) Cooperation with Prof. Vikas Thakur, NTNU, sensitive clay landslides
- 2015 (ongoing) Cooperation with Prof. Minna Karstunen, Chalmers, Sweded within the framework of the Finnish Academy project dealing with landslides
- 2014 (ongoing) Coordinator for the THEBES project. Project involves 4 participants from Finland (Aalto University, Jyväskylä University, VTT and Numerola Oy), as well as number of international institutions with whom cooperation is likely (UPC BarcelonaTech, Ecole des Ponts ParisTech, Université de Pau et des pays de l'Adour, Georgia Institute of Technology & Texas A&M University)
- 2012 (ongoing) Research visit at Silesian University of Technology in Gliwice, Poland. Cooperation on modelling dynamic soil exchange problems with material point method.
- 2014-2015 Cooperation with Prof. Scott Sloan, Newcastle University, Newcastle, Australia
- 2011 – 2014 Cooperation with the University of Western Australia on the Material Point Method and the Uintah code development.
- December 2008 Research visit at the Innsbruck University. Collaboration with Dr M. Hofmann and Prof. G. Hofstetter on comparison of implicit and explicit stress integration algorithms for Barcelona Basic Model. 3-17 December 2008, Innsbruck, Austria.
- April 2008 Research visit at Trento University. Collaboration with Dr A. Tarantino (constitutive modelling) and Mr M. Hofmann (implicit and explicit stress integration). 8-23 April 2008, Trento, Italy.

## Selected additional training

2011 – 2014	ARC Centre of Excellence workshops covering soil testing to constitutive modelling to advances in numerical methods
2013	UNSW Symposium on geotechnical modelling
2013	Prof. Paul Maine course on Cone Penetration Testing
2012	Prof. Robert Lytton course on design of pavements on expansive clays
2012	Prof. Gernot Beer course on numerical solution of boundary value problems
2011	Prof. Kerry Rowe seminar: ‘Systems engineering the design and operations of municipal solid waste landfills to minimize contamination of groundwater’
2008	‘Field equipment for soil testing: Time-Domain Reflectometry (TDR) and tensiometers.’ MUSE Hands-on training session. Field trip to Adige river embankment. 6-7 Feb 2008, Trento, Italy.
2007	Mathematical Modelling & Computational Methods in Solid Mechanics. EPSRC Mathematics Summer School
2007	MUSE school ‘Experimental Observations in Unsaturated SoilMechanics’.
2007	‘Soil-environment interactions in geotechnical engineering’ Rankine Lecture, by A. Gens (UPC).
2006	Nonlinear Continuum Mechanics. EPSRC Mathematics Summer School, 10-16 Sep 2006, Durham, UK.
2006	Muse school ‘Applications of Unsaturated Soil Mechanics’.
2006	Fourth International Conference on Unsaturated Soils. Carefree, Arizona.
2005	Muse school ‘Fundamentals of Unsaturated Soils’

### International recognition

continuing	Regular reviewer for Computers & Geotechnics journal (approximately 20 reviews in total).
regular	Chairing sessions at international conferences
irregular	reviewer for Canadian Geotechnical Journal, International Journal of Numerical Methods in Engineering, Geotechnique, Geotechnique Letters, Journal of Structural Mechanics, Soils & Foundations, International Journal of Mechanical Sciences etc.
irregular	reviewer for Czech Academy of Science, grant proposals
2013	Invited paper – UNSAT 2014 conference in Sydney
2012	Invited paper – International Journal of Geomechanics

### Voluntary Work/ Organisational skills

2004	participation in students' enrolment and preparation of the entry examinations for the Civil Engineering Faculty.
2004	member of the organising committee of the 5 <sup>th</sup> Conference of Ph. D. Students from Civil Engineering faculties, Wisła 2004.
2003	member of the organising committee of the 13 <sup>th</sup> Conference of Soil Mechanics and Foundation and 2 <sup>nd</sup> Young Geotechnics Conference

## Publications

It must be noted that the databases are always lagging behind the real performance and for such a relatively new person in research like me are not fully objective as a comparison tool. As for 17<sup>th</sup> Oct 2016, Scopus database registered 54 citations of papers I co-authored giving 2.7 citation per registered document. ISI Web of Science registered 42 citations giving 2.8 citation per registered document. Of course, the oldest papers attracted most citations, mostly because in civil engineering it takes a long time to apply new development in research and publish. Those highest cited papers were published in 2010 and attracted 22 and 13 citations (Scopus data). The reported h-index was 4 by Scopus and 3 by ISI.

### **Peer-reviewed journal papers:**

9. Sołowski W.T., Sloan S.W. (2016) Explicit stress integration with streamlined drift reduction. *Advances in Engineering Software*. 99, p. 189-198 10 p.
8. D'Onza F., Wheeler S.J., Gallipoli D., Barrera Bucio M., Hofmann M., Lloret Cabot M., Mancuso C., Pereira J.-M., Sánchez M., Solowski W., Tarantino A., Toll D.G., Vassallo R. (2015) Benchmarking selection of parameter values for the Barcelona Basic Model. *ENGINEERING GEOLOGY*. 196, p. 99-118 20 p.
7. Sołowski W.T., Sloan S.W. (2015) Evaluation of Material Point Method for use in geotechnics. *International Journal of Numerical and Analytical Methods in Geomechanics*, 39 (7).
6. Sołowski W.T., Sloan S.W. (2015) Equivalent stress approach in creation of elasto-plastic constitutive models for unsaturated soils, *International Journal of Geomechanics*, 15(2), 04014041.
5. Sołowski W.T., Sloan S.W. (2014). Material point method modelling of granular flow in inclined channels. *Applied Mechanics and Materials*, Vol. 553, pp. 501-506.
4. Sołowski W.T., Hofmann M., Hofstetter G., Sheng D., Sloan S.W. (2012). A comparative study of stress integration methods for the Barcelona Basic Model, *Computers & Geotechnics* 44:22-33. *Computers and Geotechnics*, 37(1-2), 59-67.
3. Solowski W.T., Sloan S.W. (2012). Equivalent stress approach in modelling unsaturated soils. *International Journal for Numerical and Analytical Methods in Geomechanics*. 36:1667–1681 DOI:10.1002/nag.1077
2. Sołowski WT, Gallipoli D. (2010). Explicit stress integration with error control for the Barcelona Basic Model Part I: Algorithms formulations. *Computers and Geotechnics*, 37(1-2), 59-67.
1. Sołowski WT, Gallipoli D. (2010). Explicit stress integration with error control for the Barcelona Basic Model Part II: Algorithms efficiency and accuracy. *Computers and Geotechnics*, 37(1-2), 68-81.



Other peer-reviewed publications:

22. Kuusela-Lahtinen A, Sinnathamby G, Mendez J, Sołowski WT, Gallipoli D, Pintado X, Korkiala-Tanttu LK. (2016) Estimation of water retention behaviour of MX-80 bentonite partially saturated with saline solution E3S Web Conf. 9 11006. DOI: 10.1051/e3sconf/20160911006
21. Abed AA, Laitinen M, Lämsä J, Harjupatana T, Sołowski WT, Kataja M. (2016). Hydro-mechanical modelling of MX-80 bentonite: one dimensional study. E3S Web Conf. 9 18005. DOI: 10.1051/e3sconf/20160918005
20. Sołowski W.T., Baroudi D, Ghobakhlou M, Korkiala-Tanttu L.K. (2015) Simulations of Dense Snow Avalanches with Generalized Interpolation Material Point Method: Preliminary Outcomes. PARTICLES 2015. CIMNE International Center for Numerical Methods in Engineering, p. 646-656 11 p.
19. Sołowski W.T., Sloan S.W., Wang D. (2015) Material point method simulation of a triaxial shear tests. IACMAG 2014 - Computer Methods and Recent Advances in Geomechanics, Oka et al. Eds (Taylor & Francis) ISBN: 978-1-138-00148-0
18. Sołowski W.T., Sloan S.W. Stress integration schemes for unsaturated soils. Invited lecture , UNSAT 2014 conference in Sydney. Unsaturated Soils: Research & Application, Khalili et al. Eds (Taylor & Francis), Vol. 1, p. 463-469 7 p. ISBN: 978-1-138-00150-3
17. Sołowski W.T., Sloan S.W., Kanty P.T., Kwiecień S. (2013). Numerical simulation of a small scale dynamic replacement stone column creation experiment. III International Conference on Particle-based Methods – Fundamentals and Applications PARTICLES 2013 M. Bischoff, E. Oñate, D.R.J. Owen, E. Ramm & P. Wriggers (Eds), 522-533.
16. Sołowski W.T., Sloan S.W. (2013) Modelling of sand column collapse with material point method. Published at Computational Geomechanics COMGEO 2013 conference in Krakow, Poland (Pietruszczak & Pande Eds).
15. Sołowski W.T., Sloan S.W. (2012) Elastic or elasto-plastic: examination of certain strain increments in the Barcelona Basic Model. Second European Conference on Unsaturated Soils E-UNSAT 2012. in Naples, Unsaturated Soils: Research and Applications, Mancuso, Jommi & D'Onza Eds, Vol 2:85-91.
14. Sołowski W.T., Sloan S.W. (2012). Definition of stress in constitutive modelling of partially saturated soils and granular media. In ESMC-2012 - 8th European Soil Mechanics Conference Graz, Austria, July 9-13 2012. Book of Abstracts. (Holzapfel & Ogden Eds). ISBN 978-3-85125-223-1.
13. Sołowski, W.T., Sloan S.W. (2011) An equivalent stress implementation of Barcelona Basic Model. Proceedings of IACMAG 2011 conference in Melbourne, 9-11 May 2011, Khalili & Oeser (Eds), 638-642.

12. Sołowski W.T., Sheng D., Sloan S.W. (2011) Explicit stress integration with reduced drift for Barcelona Basic Model. *Proceedings of the Fifth International conference on unsaturated soils UNSAT 2010 in Barcelona, Unsaturated Soils – Alonso & Gens (Eds.)*, 1075-1080.
11. Sołowski W.T., Sheng D. (2010). A simple time stepping algorithm for material point method. *Proceedings of the Numerical Methods in Geotechnical Engineering NUMGE 2010 (Benz & Nordal Eds)*. 157-162.
10. Sołowski W.T., Hoffman M., Hofstetter G. (2010). Comparison of explicit and implicit integration schemes for the Barcelona Basic Model. *Proceedings of the 4<sup>th</sup> Asia – Pacific Conference on Unsaturated Soils (Buzzi, Fityus & Sheng Eds)*, Taylor & Francis: 705-710.
9. Sołowski WT (2008) *Unsaturated Soils: constitutive modelling and explicit stress integration*. PhD Thesis, Durham University, UK
8. Sołowski W.T., Crouch R.S., Gallipoli D. (2008) A multi-cell extension to the Barcelona Basic Model. *Unsaturated Soils: Advances in Geo-Engineering Proceedings of First European Conference on Unsaturated Soils E-UNSAT 2008 (Toll et al. Eds)*, Taylor & Francis:727- 733.
7. Sołowski W.T., Gallipoli D. (2007) Numerical integration of elasto-plastic constitutive models using the extrapolation method. In: *Proceedings of the NUMOG X conference. Rhodes. Greece, 25-27 April 2007*, Taylor & Francis:211-217.
6. Sołowski W.T., Gallipoli D. (2006) A stress-strain integration algorithm for unsaturated soil elastoplasticity with automatic error control. In: *Numerical Methods in Geotechnical Engineering – Schweiger (ed.). Proceedings of the 6<sup>th</sup> European conference on numerical methods in geotechnical engineering, Graz, Austria, 6–8 September 2006*. Taylor & Francis:113-119.
5. Sołowski, W, Gallipoli, D. (2006) Development of finite element code for unsaturated soils. In: *proceedings from the 19th Workshop of Marie Curie Fellows: Research Training in Progress. Making Europe more Attractive for Researchers. Pisa/Livorno (Italy), 28-30 September, 2005. Edited by European Commission - Directorate-General for Research*. EUR 22022. ISSN 1018-5593.
4. Sołowski W.T. (2004) Influence of soil nonlinearity in small strain range on the behaviour of concrete floor slabs (in Polish). *Materiały V Konferencji Naukowej Doktorantów Wydziałów Budownictwa, Zeszyty Naukowe Politechniki Śląskiej, z.102*, Gliwice, Poland.
3. Gryczmański M., Sołowski W.T. (2004) Soil – concrete floor system under moving loads (in Polish). *Materiały II Problemowej Konferencji Geotechniki „Współpraca Budowli z Podłożem”, t. 1*, Białowieża, Poland.
2. Sołowski W.T. (2003) Numerical Modelling of the nonlinear soil – concrete floor interaction (in Polish). *Materiały IV Konferencji Naukowej Doktorantów Wydziałów Budownictwa, Zeszyty Naukowe Politechniki Śląskiej, z. 101*, Gliwice, Poland.

1. Sołowski W.T. (2003) Analysis of a soil – slab-column structure interaction. (in Polish).  
*Materiały II Ogólnopolskiej Konferencji Młodych Geotechników, Zeszyty Naukowe Politechniki Śląskiej, z. 98, Gliwice, Poland.*

## Presentations & posters

11. Sołowski W.T. (2011- 2014) – presentations at annual ARC Centre of Excellence meetings. Presentations describe advances in the Material Point Method and its use for moving boundary problems (one of the core task of the Centre)
10. Sołowski W.T., Sloan S.W. (2011). Accuracy comparison of Material Point Method with Gimp and cpdi interpolation with known numerical and analytical solutions for geotechnical problems. Abstract only. Particles 2011, II International Conference on Particle-based Methods, Fundamentals and Applications, Barcelona, Spain, 26-28 Oct 2011.
9. Sołowski W.T. (2011) Comparison of various modelling techniques in the Material Point Method. Presentation at the Centre of Excellence meeting, February 2011, University of Newcastle, Australia
8. Sołowski W.T., Sheng D. (2010) Material point method algorithm with automatic time stepping and error control for elastic problems. 9th World Congress on Computational Mechanics and 4th Asian-Pacific Congress on Computational Mechanics WCCM 2010, 19-23 July 2010, Sydney, Australian.
7. Sołowski W.T., Crouch R.S., Gallipoli D. (2007) A simple constitutive model for unsaturated soil with respect to fabric microstructure. Poster on the ALERT geomaterials workshop in Aussois, France.
6. Sołowski W.T., Crouch R.S., Gallipoli D. (2007) Explicit stresss integration algorithms. Research Day poster and presentation. 25 June 2007, Durham, UK.
5. Sołowski W.T., Gallipoli D. (2007) Explicit Runge-Kutta stress integration of the BBM. Presentation during MUSE Workshop, 17-18 May 2007, Naples, Italy
4. Sołowski W.T., Gallipoli D. (2006) A stress-strain integration algorithm for unsaturated soil elastoplasticity with automatic error control. Research Day poster and presentation. 26 June 2006, Durham, UK.
3. Sołowski W.T., Gallipoli D. (2006) An integration algorithm for the BBM with automatic error control. Presentation during MUSE Workshop, 15-16 May 2006, Paris, France.
2. Sołowski W.T., Gallipoli D. (2005) Outline of development of finite element code for unsaturated soils. Research Day presentation. 24 June 2006, Durham, UK.
1. Sołowski W.T., Gryczmanski M. (2005) An outline of a simple critical state soil model with compaction and small strain capabilities. Presentation during MUSE Workshop, 28-29 June 2005, Barcelona, Spain.