

# Adrian R. Russell

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## Summary

Dr Adrian Russell is an Associate Professor in Geotechnical Engineering in the School of Civil and Environmental Engineering at UNSW and a member of the Centre for Infrastructure and Engineering Safety (CIES). As a geotechnical engineer, Russell looks to understand how infrastructure such as buildings, foundations, tailings storages, roads, tunnels, bridges, railways and ports interact with the ground. His research interests include soil mechanics, rock mechanics and the mechanics of fibre reinforced geomaterials and their use in infrastructure to increase strength and failure resistance. He teaches widely on soil mechanics, geotechnical engineering and design to civil and mining engineering students at undergraduate and postgraduates levels. He also delivers the travelling workshop 'Unsaturated soil mechanics for practicing engineers' to industry professionals on behalf of the Australian Geomechanics Society. He worked as a consulting geotechnical engineer for three years prior to joining academia.

## Education

PGCert in Higher Education, University of Bristol, UK, 2008

PhD, The University of New South Wales, Australia, 2005

BE (Civil Engineering), The University of New South Wales, 1998

## Research interests

Associate Professor Russell currently leads a research group comprising 1 research associate, 5 PhD students, 2 Masters students and 1 practicum student working in the research areas of:

- (i) applied unsaturated soil mechanics, particularly the way unsaturated soils can be characterised using in situ tests, and the way unsaturated soils interact with shallow foundations and retaining walls;
- (ii) the fundamental modelling of the stress–strain behaviour of soils, linking microstructure to large scale behaviour;
- (iii) fundamental rock mechanics, focussing on failure mechanisms and microstructural deformation;
- (iv) the mechanics of fibre reinforced geomaterials and their use in infrastructure to increase strength and failure resistance; and
- (v) dynamics and liquefaction of soils and tailings.

Russell uses mainly analytical modelling techniques in his research, along with full scale physical model experiments, for example using UNSW's biaxial seismic simulator:

<https://www.engineering.unsw.edu.au/civil-engineering/research/our-research-facilities/biaxial-seismic-simulator>

He has supervised to completion eight high-quality PhD graduates. Many hold appointments at leading universities in Australia and internationally (Monash University, Bristol University, Imperial College, University of Hong Kong).

## Industry engagement through research

Russell's research has been taken up by industry. Recent examples include:

- The development of a new type of soil-cement-fibre mix technology for use in retaining wall systems to reduce cost and embodied carbon, in partnership with Wagstaff Piling Pty Ltd. Outcomes feature in a 2017 paper published in the journal *Geosynthetics International*.
- The developed a technique to prevent blockages in ore passes when the ore is moist making it 'sticky', in partnership with Glencore Pty Ltd. Outcomes feature in a 2016 paper published in the *International Journal for Rock Mechanics and Mining Sciences*.

## Selected publications

(from career total of 90)

1. Russell, A.R. and Reid, D. (2018 – in press). Pitfalls in using CPT results to classify partially saturated tailings. In *Proceedings of the 21st International Seminar on Paste and Thickened Tailings*.
2. Tang, Y., Vo, T., Taiebat, H. and Russell, A.R. (2018 – in press) Influences of suction on plate load tests on unsaturated silty sands. *Journal of Geotechnical and Geoenvironmental Engineering*. Accepted 05/01/2018.
3. Tang, Y., Taiebat, H. and Russell, A.R. (2018) Numerical modelling of consolidation of unsaturated soils considering hydraulic hysteresis. *International Journal of Geomechanics*. 18(2):04017136.
4. Vo, T., and Russell, A.R. (2017) Stability charts for curvilinear slopes in unsaturated soils. *Soils and Foundations*. 57(4):543-556.
5. Russell, A.R., Chapman, M., Teh, S.H. and Wiedman, T. (2017). Cost and embodied carbon reductions in cutter soil mix walls through fibre reinforcement. *Geosynthetics International*. 24(3):280-292.
6. Russell, A.R. and Reid, D. (2016). Effects of suction on CPT results and soil classification. In *Proceedings of the 5th International Conference on Geotechnical and Geophysical Site Characterisation*.
7. Vo, T., and Russell, A.R. (2016) Interaction between retaining walls and unsaturated soils in experiments and using slip line theory. *Journal of Engineering Mechanics-ASCE*. 04016120.
8. Vo, T., Yang, H. and Russell, A.R. (2016). Cohesion and suction induced hang-up in ore passes. *International Journal of Rock Mechanics and Mining Sciences*. 87:113-128.
9. Vo, T., Taiebat, H. and Russell, A.R. (2016) Interaction between a rigid retaining wall and unsaturated soil in experiments. *Géotechnique*. 66(5):366-377.
10. Yang, H. and Russell, A.R. (2016) The cone penetration test in an unsaturated silty sand. *Canadian Geotechnical Journal*. 53(3):431-444.
11. Vo, T., and Russell, A.R. (2016) Bearing capacity of strip footings in unsaturated soils using the slip line theory. *Computers and Geotechnics*. 74:122-131.
12. Russell, A.R. (2014). How water retention in fractal soils depends on particle and pore sizes, shapes, volumes and surface areas. *Géotechnique*. 64(5):379-390.
13. Pournaghiazar, M., Russell, A.R. and Khalili, N. (2013). The cone penetration test in unsaturated sands. *Géotechnique*, 63(14):1209-1220.
14. Pournaghiazar, M., Russell, A.R. and Khalili, N. (2012). Linking cone penetration resistances measured in calibration chambers and the field. *Géotechnique Letters*. 2:29-35.
15. Diambra, A., Ibraim, E., Russell, A.R. and Muir Wood, D. (2011) Modelling the undrained response of fibre reinforced sands. *Soils and Foundations*. 51(4):625-636.
16. Pournaghiazar, M., Russell, A.R. and Khalili, N. (2011). Development of a new calibration chamber for conducting cone penetration tests in unsaturated soils. *Canadian Geotechnical Journal*. 48(2):314-321.
17. Ibraim, I., Diambra, A., Muir Wood, D. and Russell, A.R. (2010). Static liquefaction of fibre reinforced sand under monotonic loading. *Geotextiles and Geomembranes*. 28(4):374-385.
18. Diambra, A., Ibraim, I., Muir Wood, D. and Russell, A.R. (2010). Fibre reinforced sands: experiments and modelling. *Geotextiles and Geomembranes*. 28(3):238-250.

## **Awards/honours to A/Prof Russell and his PhD students**

Invited Lecturer at InterPore 2016, a conference of the International Society for Porous Media.

Invited Lecturer at a conference on Advancing Experimental Geomechanics 2016.

International Best Journal Paper Award, from TC106, the Technical Committee on Unsaturated Soils within the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE), 2016.

Keynote Lecturer at the Australian Academy of Science Elizabeth and Frederick White conference in 2015.

The Best Paper Award at Australasia's ACCM in 2015.

International Innovation Award, from TC106, 2014.

Editor's Choice Award, one of four best journal papers in Géotechnique Letters in 2012

Editor's Choice Award, one of four best journal papers in Géotechnique Letters in 2011.

Received the IACMAG Excellent Journal Paper Award in 2011.

Delivered a semi-plenary lecture to IACMAG in 2011.

The Australian Geomechanics Society (AGS) Research Award (NSW) in 2011.

The Best Paper Award at the UK's YGES in 2008.

The Best Paper Award at IS-KYUSHU in 2007.

## **Professional Organisations/Affiliations**

Visiting Fellow, The Australian National University, 2013-2015

Visiting Scholar, The University of Sydney, 2010

Member, Australian Geomechanics Society

Member, Australasian Association for Computational Mechanics

## **Editorial Boards**

Computers and Geotechnics

## **Service Roles**

Committee Member, Australian Geomechanics Society, Sydney Chapter, 2016- present

Executive Committee Member, Australasian Association for Computational Mechanics, 2012- present

Secretary, TC106, The Technical Committee on Unsaturated Soils with the ISSMGE, 2014- present

Secretary, The Sixth International Conference on Unsaturated Soils, held in Sydney 2-4 July 2014

Chair, TC106 Awards Subcommittee, 2012- present