

Lauri Uotinen
Staff Scientist
Mineral Based Materials and Mechanics
Department of Civil Engineering
Postal address:
Rakentajanaukio 4 A, 02150 Espoo
Email: lauri.uotinen@aalto.fi
Mobile: +358505691015



Prizes

Aalto University School of Engineering Award for Achievements in Teaching 2019
Janiszewski, Mateusz (Recipient) & Uotinen, Lauri (Recipient), Jan 2020

Best poster award
Uotinen, Lauri (Recipient), 26 Sep 2013

Best poster award
Uotinen, Lauri (Recipient), 20 Sep 2012

Sinorock prize for Best Paper by Young Person outside China
Uotinen, Lauri (Recipient), 20 Jun 2013

Young Rock Engineer Award
Uotinen, Lauri (Recipient), 24 Sep 2021

Projects

EMMEP/EMC: EMMEP/EMC
Paaso, M., Janiszewski, M., Antikainen, J., Uotinen, L. & Rinne, M.
01/01/2014 → 31/12/2018

Fractusan
Rinne, M., Sirkiä, J., Karttunen, S., Oraskari, J., Savikko, H., Szydłowska, M. & Uotinen, L.
12/06/2017 → 31/01/2019

GAGS: Geophysical and Geochemical Methods for Stope Design
Baghbanan, A., Kangas, L., Lange, M., Rinne, M., Janiszewski, M., Kiuru, R., Laine, I., Kangas, L., Uotinen, L. & Leveinen, J.
01/10/2018 → 31/05/2022

I2Mine (CP Large)
Rinne, M., Uotinen, L., Mishra, R., Szydłowska, M., Janiszewski, M., Siren, T., Sirkiä, J., Song, Z., Dong, S. & Samimi Namin, F.
01/11/2011 → 31/10/2016

ORMID: On-line Risk Management in Deep Mines
Rinne, M., Uotinen, L., Mishra, R., Siren, T., Janiszewski, M., Szydłowska, M., Caballero Hernandez, E., Kiuru, R. & Kantia, P.
01/03/2016 → 31/12/2019

RAKKA: Rakoilleen kalliomassan vedenjohtavuus
Rinne, M., Torkan, M. & Uotinen, L.
01/02/2019 → 31/01/2020

RAKKA: Rakoilleen kalliomassan vedenjohtavuus

Rinne, M., Hedström, O., Uotinen, L. & Torkan, M.
01/02/2020 → 31/01/2021

Rakoilleen kalliomassan vedenjohtavuus

Rinne, M., Hedström, O., Torkan, M. & Uotinen, L.
01/02/2021 → 31/01/2022

RAKKA: Rakoilleen kalliomassan vedenjohtavuus

Rinne, M., Hedström, O., Torkan, M. & Uotinen, L.
01/01/2022 → 31/01/2023

Reaaliaikainen kalliomekaaninen malli

Rinne, M. & Uotinen, L.
01/01/2014 → 31/12/2015

REMOS: REMOS TUTL

Rinne, M., Hulkkonen, T., Janiszewski, M., Hedström, O., Karttunen, S., Tiainen, J. & Uotinen, L.
01/06/2019 → 30/04/2021

Tackling the Challenges of a Solar Community Concept in High latitudes

Rinne, M., Uotinen, L., Janiszewski, M., Siren, T. & Caballero Hernandez, E.
01/01/2015 → 31/12/2017

VYR KARMO II

Rinne, M., Uotinen, L., Antikainen, J., Hedström, O. & Sirkiä, J.
01/02/2015 → 31/01/2016

VYR KARMO III 2017

Rinne, M., Caballero Hernandez, E., Hedström, O. & Uotinen, L.
01/01/2017 → 31/01/2018

VYR KARMO III 2018

Rinne, M., Caballero Hernandez, E., Uotinen, L., Szydlowska, M. & Hakala, V.
01/02/2018 → 31/01/2019

Activities**International Workshop on Fracturing Geomechanics**

Mateusz Janiszewski (Member), Mikael Rinne (Chair), Lauri Uotinen (Member), Otto Hedström (Member), Johannes Suikkanen (Member), Baotang Shen (Chair) & Ove Stephansson (Member)
12 Jun 2019 → 13 Jun 2019

Eurock 2015, Salzburg, 6.10.-9.10.2015, Austria

Lauri Uotinen (Contributor)
2015

The 13th International ISRM Congress 2015 International Congress on Rock Mechanics, Montreal, 10.-13.5.2016, Canada

Lauri Uotinen (Contributor)
2015

KTH Royal Institute of Technology

Lauri Uotinen (Visiting researcher)

2014

University

Lauri Uotinen (Student)
2014

University (External organisation)

Lauri Uotinen (Chair)
2012

Research outputs

Effect of anisotropy of fracture surface on fluid flow

Torkan, M., Hosseini Khorasgani, AMIR., Uotinen, L., Baghbanan, A. & Rinne, M., 10 Jan 2023, In: IOP Conference Series: Earth and Environmental Science. 1124, 8 p., 012036.

Evaluation of surface roughness of rock-like joints using close range photogrammetry method

Momeni, A. H., Torkan, M., Azhari, A., Uotinen, L. & Baghbanan, A., 10 Jan 2023, In: IOP Conference Series: Earth and Environmental Science. 1124, 8 p.

Method to obtain 3D point clouds of tunnels using smartphone LiDAR and comparison to photogrammetry

Torkan, M., Janiszewski, M., Uotinen, L. & Rinne, M., 10 Jan 2023, In: IOP Conference Series: Earth and Environmental Science. 1124, 012016.

Rapid tunnel scanning using a 360-degree camera and SfM photogrammetry

Janiszewski, M., Prittinen, M., Torkan, M. & Uotinen, L., 10 Jan 2023, In: IOP Conference Series: Earth and Environmental Science. 1124, 8 p., 012010.

Virtual reality learning system for remote rock mass mapping

Janiszewski, M., Zhang, X., Uotinen, L. & Rinne, M., 10 Jan 2023, In: IOP Conference Series: Earth and Environmental Science. 1124, 6 p., 012079.

Rapid Photogrammetry with a 360-Degree Camera for Tunnel Mapping

Janiszewski, M., Torkan, M., Uotinen, L. & Rinne, M., 31 Oct 2022, In: Remote Sensing. 14, 21, 20 p., 5494.

Photogrammetric Method to Determine Physical Aperture and Roughness of a Rock Fracture

Torkan, M., Janiszewski, M., Uotinen, L., Baghbanan, A. & Rinne, M., 1 Jun 2022, In: Sensors (Basel, Switzerland). 22, 11, 25 p., 4165.

Method for estimating rockfall failure probability using photogrammetry

Uotinen, L., Janiszewski, M., Mishra, R., Munukka, H., Szydlowska, M., Martinelli, D. & Dabove, P., 6 Sep 2021, In: IOP Conference Series: Earth and Environmental Science. 833, 1, 8 p., 012063.

Monitoring of rock stress change using instrumented rebar rock bolts

Mai, W., Janiszewski, M., Uotinen, L., Mishra, R. & Rinne, M., 6 Sep 2021, In: IOP Conference Series: Earth and Environmental Science. 833, 1, 9 p., 012141.

Photogrammetry based characterization of hydro-mechanical properties of a rock fracture

Torkan, M., Uotinen, L., Nieminen, V. & Rinne, M., 6 Sep 2021, In: IOP Conference Series: Earth and Environmental Science. 833, 1, 9 p., 012019.

Photogrammetric prediction of rock fracture properties and validation with metric shear tests

Uotinen, L., Torkan, M., Baghbanan, A., Hernández, E. C. & Rinne, M., Jul 2021, In: Geosciences (Switzerland). 11, 7, 31 p., 293.

A Bayesian network approach for geotechnical risk assessment in underground mines

Mishra, R., Uotinen, L. & Rinne, M., Jun 2021, In: Journal of the Southern African Institute of Mining and Metallurgy. 121, 6, p. 287-294 8 p.

Visualization of 3D rock mass properties in underground tunnels using extended reality

Janiszewski, M., Uotinen, L., Szydłowska, M., Munukka, H. & Dong, J., 23 Apr 2021, In: IOP Conference Series: Earth and Environmental Science. 703, 1, 6 p., 012046.

Characterization of hydro-mechanical properties of rock fractures using steady state flow tests

Uotinen, L., Torkan, M., Janiszewski, M., Baghbanan, A., Nieminen, V. & Rinne, M., 13 Nov 2020, *ISRM International Symposium - EUROCK 2020*. Li, C. C., Odegaard, H., Høien, A. H. & Macias, J. (eds.). Norsk Betongforening, 8 p.

Digitisation of hard rock tunnel for remote fracture mapping and virtual training environment

Janiszewski, M., Uotinen, L., Baghbanan, A. & Rinne, M., Nov 2020, *ISRM International Symposium - EUROCK 2020: International Society for Rock Mechanics and Rock Engineering Norwegian Group for Rock Mechanics*. Li, C. C., Ødegaard, H., Høien, A. H. & Macias, J. (eds.). Norsk Betongforening, 8 p.

Virtual Reality Learning Environments for Rock Engineering, Geology and Mining Education

Janiszewski, M., Uotinen, L., Merkel, J., Leveinen, J. & Rinne, M., 22 Sep 2020, *54th U.S. Rock Mechanics/Geomechanics Symposium, 28 June - 1 July: physical event cancelled*. American Rock Mechanics Association, 7 p. ARMA-2020-1101

Accuracy of GPR based 3D fracture surface geometry interpretation

Kiuru, R., Kantia, P. & Uotinen, L., 12 Dec 2019.

Kalliorakenteiden digitointi valokuvamittauksen avulla

Uotinen, L., 23 Oct 2019, In: Geofoor. 49, p. 22-23 2 p.

VR learning environments for rock engineering and mining education

Janiszewski, M., Uotinen, L., Merkel, J., Leveinen, J. & Rinne, M., 18 Oct 2019, p. 13.

Photogrammetry for recording rock surface geometry and fracture characterization

Uotinen, L., Janiszewski, M., Baghbanan, A., Caballero Hernandez, E., Oraskari, J., Munukka, H., Szydłowska, M. & Rinne, M., 17 Sep 2019, *Proceedings of the 14th International Congress on Rock Mechanics and Rock Engineering (ISRM 2019), Foz do Iguassu, Brazil, 13-18 September 2019: Rock Mechanics for Natural Resources and Infrastructure Development - Full Papers*. da Fontoura, S. A. B., Rocca, R. J. & Pavón Mendoza, J. F. (eds.). CRC Press, p. 461-468 8 p. (Proceedings in Earth and geosciences; vol. 6).

Combining expert opinion and instrumentation data using Bayesian networks to carry out stope collapse risk assessment

Mishra, R., Kiuru, R., Uotinen, L., Janiszewski, M. & Rinne, M., 9 Apr 2019, *Mining geomechanical risk 2019: Proceedings of the First International Conference on Mining Geomechanical Risk*. Perth: Australian Centre for Geomechanics, p. 85-96 12 p.

Effective modelling of borehole solar thermal energy storage systems in high latitudes

Janiszewski, M., Siren, T., Uotinen, L. K. T., Oosterbaan, H. & Rinne, M., 10 Dec 2018, In: GEOMECHANICS AND ENGINEERING. 16, 5, p. 503-512 10 p.

In Situ Experiment and Numerical Model Validation of a Borehole Heat Exchanger in Shallow Hard Crystalline Rock

Janiszewski, M., Caballero Hernandez, E., Siren, T., Uotinen, L., Kukkonen, I. & Rinne, M., 17 Apr 2018, In: Energies. 11, 4, 21 p., 963.

Prediction of stress-driven rock mass damage in spent nuclear fuel repositories in hard crystalline rock and in deep underground mines

Uotinen, L., 2018, Aalto University. 164 p.

Numerical predictions for underground thermal energy storage experiment in the Otaniemi research tunnel

Janiszewski, M., Caballero Hernandez, E., Siren, T., Uotinen, L. & Rinne, M., 11 Oct 2017, *3rd Nordic Rock Mechanics Symposium NRMS 2017 : Symposium Proceedings*. Johansson, E. & V. R. (eds.). Suomen rakennusinsinöörien liitto RIL, p. 77-85 9 p. (RIL / Suomen rakennusinsinöörien liitto).

Modelling of Borehole Solar Energy Storage Concept in High Latitudes

Siren, T., Janiszewski, M., Uotinen, L. K. T. & Oosterbaan, H., 11 May 2017, *2017 YSRM Young Scholars' Symposium on Rock Mechanics: Proceedings of Korea*, p. 369-372 4 p.

Elastoplastic Modelling of an In Situ Concrete Spalling Experiment using the Ottosen Failure Criterion

Uotinen, L. & Siren, T., 31 Jan 2017, In: *Journal of Engineering*. 2017, 17 p., 4723017.

A method to downscale joint surface roughness and to create replica series using 3D printed molds

Uotinen, L., Korpi, E., Hartikainen, A., Yorke, R., Antikainen, J., Johansson, F. & Rinne, M., 2017, *ISRM 13th International Congress on Rock Mechanics, Montreal, May 10-13, 2015*. Canadian Institute of Mining, Metallurgy and Petroleum, 11 p.

Bayesian Network Approach for Geotechnical Risk Assessment in Underground Mines

Mishra, R., Uotinen, L. K. T. & Rinne, M., 2017, (Submitted) In: *Safety Science*.

Geotechnical risk management concept for intelligent deep mines

Mishra, R., Janiszewski, M., Uotinen, L., Szydlowska, M., Siren, T. & Rinne, M., 2017, *Symposium of the International Society for Rock Mechanics*. Elsevier, Vol. 191. p. 361-368 (Procedia engineering; vol. 191).

Numerical thermal back-calculation of the Kerava Solar Village underground thermal energy storage

Oosterbaan, H., Janiszewski, M., Uotinen, L., Siren, T. & Rinne, M., 2017, In: *Procedia Engineering*. 191, p. 352-360 8 p.

Pull Experiment to Validate Photogrammetrically Predicted Friction Angle of Rock Discontinuities

Dzugala, M., Sirkiä, J., Uotinen, L. & Rinne, M., 2017, *Symposium of the International Society for Rock Mechanics*. Elsevier, p. 378-385 8 p. (Procedia engineering; vol. 191).

Real-Time Risk Assessment and Ground Support Optimisation in Underground Mines

Mishra, R., Ritala, F., Janiszewski, M., Uotinen, L. & Siren, T., 14 Oct 2016, *Proceedings of the Eighth International Symposium on Ground Support in Mining and Underground Construction: Ground Support 2016*. Nordlund, E., Jones, T. H. & Eitzenberger, A. (eds.). Luleå: Luleå University of Technology, 12 p. 209

Using Observational Method to Manage Safety Aspects of Remedial Grouting of Concrete Dam Foundations

Spross, J., Johansson, F., Uotinen, L. K. T. & Rafi, J. Y., Oct 2016, In: *Geotechnical and Geological Engineering*. 34, 5, p. 1613-1630 18 p.

Feasibility of underground seasonal storage of solar heat in Finland

Janiszewski, M., Kopaly, A., Honkonen, M., Kukkonen, I., Uotinen, L., Siren, T. & Rinne, M., 29 Sep 2016, *International Conference on Geo-mechanics, Geo-energy and Geo-resources: Conference Proceedings*. PG, R. & Jian, Z. (eds.). Melbourne, Australia: Monash University, p. 959-965 7 p. 236

Photogrammetric calculation of JRC for rock slope support design

Sirkiä, J., Kallio, P., Iakovlev, D. & Uotinen, L., 14 Sep 2016, *Proceedings of the Eighth International Symposium on Ground Support in Mining and Underground Construction: Ground Support 2016*. Nordlund, E., Jones, T. H. & Eitzenberger, A. (eds.). Luleå: Luleå University of Technology, 13 p.

Determination of joint mechanical parameters for stability analysis in low stress open pit mines

Iakovlev, D., Sirkiä, J., Kallio, P. & Uotinen, L., 12 May 2016, *7th International Symposium on In-Situ Rock Stress: Symposium Proceedings*. Johansson, E. & Raasakka, V. (eds.). Tampere, Finland: Suomen rakennusinsinöörien liitto RIL, p. 625-634 10 p. (RIL).

Stress State Change Monitoring Using Displacement Change Measurements

Ritala, F., Siren, T. & Uotinen, L., 12 May 2016, *7th International Symposium on In-Situ Rock Stress: Symposium Proceedings*. Johansson, E. & Raasakka, V. (eds.). Tampere, Finland: Suomen rakennusinsinöörien liitto RIL, 9 p. (RIL).

Thermally Induced Rock Stress Increment And Rock Reinforcement Response

Ström, J., Hakala, M., Suikkanen, J., Siren, T., Uotinen, L. & Nuijten, G., 10 May 2016, *7th International Symposium on In-Situ Rock Stress: Symposium proceedings*. Johansson, E. & Raasakka, V. (eds.). Tampere, Finland: Suomen rakennusinsinöörien liitto RIL, 10 p. (RIL).

Fracture Mechanics Modelling of an In Situ Concrete Spalling Experiment

Siren, T., Uotinen, L., Rinne, M. & Shen, B., 2015, In: *Rock Mechanics and Rock Engineering*. 48, 4, p. 1423-1438

Real time stress change estimation using strain measurements

Kodeda, S., Ritala, F., Siren, T. & Uotinen, L., 2015, *Eurock 2015 & 64th Geomechanics Colloquium, Salzburg, Austria, October 7-10, 2015*. Schubert, W. & Kluckner, A. (eds.). Graz: Austrian Society for Geomechanics, p. 1071-1076

Thermally Induced Rock Stress Increment and Rock Reinforcement Response

Hakala, M., Ström, J., Nuijten, G., Uotinen, L., Siren, T. & Suikkanen, J., 15 Aug 2014, POSIVA OY, 72 p.

Improving teaching methods of rock mass classification parameters

Barbens, P. T., Uotinen, L., Toivanen, T-L. & Edelbro, C., 2014, *Eurock 2014. Rock Engineering and Rock Mechanics: Structures in and on Rock Masses, Vigo, Spain 26-28 May 2014*. Alejano, L. R., Peruchó, A., Olalla, C. & Jimenez, R. (eds.). Leiden: CRC Press, p. 451-455

Kalliotekniikan kerho KTK

Hurskainen, P. & Uotinen, L., 2014, In: *MATERIA*. 3, p. 70

Modified yield-line theory approach to determine sprayed concrete flexural capacity

Uotinen, L., Suikkanen, J. & Siren, T., 2014, *7th International Symposium on Sprayed Concrete, Sandefjord, Norway, 16.-19. June 2014: Modern Use of Wet Mix Sprayed Concrete for Underground Support*. Beck, T., Woldmo, O. & Engen, S. (eds.). Norwegian Society of Graduate Technical and Scientific Professionals (Tekna), p. 387-400

Design of sprayed concrete as hard rock reinforcement using yield-line theory

Uotinen, L. K. T., Salo, O. & Rinne, M., 2013, *Rock Characterisation, Modelling and Engineering Design Methods - Proceedings of the 3rd ISRM SINOROCK 2013 Symposium*. CRC Press, p. 817-822 6 p.

In-situ experiment concerning thermally induced spalling of circular shotcreted shafts in deep crystalline rock

Uotinen, L., Siren, T., Martinelle, D. & Hakala, M., 2013, *World Tunnel Congress 2013, Switzerland, May 31- June 7, 2013*. Anagnostou, G. & Ehrbar, H. (eds.). London: TAYLOR & FRANCIS, p. 808-815

Semiautomatic Characterization of Rock Masses Using Photogrammetry, 3D Printing Technology and Ground Penetrating Radar

Uotinen, L., Song, Z., Hedström, O., Huuskonen-Snicker, E., Toivanen, T-L., Palmén, J. & Hokkanen, T., 2013, p. 108-108 . 1 p.

Rock engineering design process in ONKALO rock characterisation facility

Uotinen, L., Nuijten, G., Martinelli, D., Lehmusjärvi, R. & Rinne, M., 30 May 2012, *Rock Engineering and Technology for Sustainable Underground Construction EUROCK 2012, Stockholm 28-30.5.2012*. Stockholm: International Society for Rock Mechanics ISRM, 11 p.

Rock mechanical modelling of Keilaniemi metro station of Länsimetro in Finland

Martinelli, D., Ström, J., Westerlund, G., Uotinen, L. & Nuijten, G., 2012, *Rock Engineering and Technology for Sustainable Underground Construction EUROCK 2012, Stockholm 28-30.5.2012*. Stockholm: International Society for Rock Mechanics ISRM, 11 p.

Assessment of the Potential for Rock Spalling in the Technical Rooms of the ONKALO: Work Report 2011-35
Uotinen, L., Siren, T. & Martinelli, D., 10 Aug 2011, POSIVA OY, 40 p.

Design of shotcrete rock reinforcement in hard rock according to Eurocode
Uotinen, L., 6 Jun 2011, *Seminar on Geoengineering*. 21 p.

Eurocodes in Hard Rock Engineering in Finland

Uotinen, L., Nuijten, G., Siren, T., Stöm, J., Hakala, M. & Rinne, M., 22 May 2011, *ITA-AITES World Tunnel Congress, Helsinki 20-26.5.2011*. Helsinki: Finnish Tunnelling Association MTR, p. 126-127

Numerical spalling assessment methods in crystalline rock during the design of ONKALO rock characterization facility
Siren, T., Martinelli, D., Uotinen, L., Nuijten, G. & Lehmusjärvi, R., 22 May 2010, *World Tunnel Congress 2011: Underground spaces in the service of a sustainable society*. 8 p.

Spalling prediction methods in high stress conditions

Siren, T., Uotinen, L., Ström, J., Lehmusjärvi, R. & Rinne, M., 2 Oct 2009, *Get Underground 2009: Underground Space Seminar*. 11 p.

Stochastically Determined Safety of Underground Structures According to Eurocode

Uotinen, L., Siren, T. & Lehmusjärvi, R., 2 Oct 2009, *Get Underground 2009: Underground Space Seminar*. 10 p.

Press/Media

Design of shotcrete rock reinforcement in hard rock according to Eurocode.pdf

Lauri Uotinen

14/06/2018

1 item of Media coverage

Study Findings from Aalto University Broaden Understanding of Remote Sensing (Rapid Photogrammetry with a 360-Degree Camera for Tunnel Mapping)

Mateusz Janiszewski, Mikael Rinne & Lauri Uotinen

29/11/2022

1 item of Media coverage

Suomalaistutkija sai merkittävän palkinnon – tutkii kivien putoamista kallioleikkauksissa

Lauri Uotinen

30/09/2021

1 item of Media coverage

Suomalaistutkija sai merkittävän palkinnon – tutkii kivien putoamista kallioleikkauksissa

Lauri Uotinen

01/10/2021

1 Media contribution