

List of publications

Journal articles

- J. Karátson, S. Sysala, M. Béreš: Quasi-Newton iterative solution approaches for nonsmooth elliptic operators with applications to elasto-plasticity. Submitted revision, 2024.
- B.D. Reddy, S. Sysala: [The elastic threshold for strain-gradient plasticity, and comparison of theoretical results with experiments](#). European Journal of Mechanics / A Solids, 2024.
- T. Lubier, S. Sysala: [Robust block diagonal preconditioners for poroelastic problems with strongly heterogeneous material](#). Numerical Linear Algebra with Applications 2024; 31(3): e2546.
- J. Karátson, S. Sysala, M. Béreš: [Quasi-Newton variable preconditioning for nonlinear elasticity systems in 3D](#). Numerical Linear Algebra with Applications 2024; 31(3): e2537.
- S. Sysala, F. Tschuchnigg, E. Hruběšová, Z. Michalec: [Optimization variant of the shear strength reduction method and its usage for stability of embankments with unconfined seepage](#). Computers and Structures 281, 2023, 107033.
- S. Sysala, E. Hruběšová, Z. Michalec, F. Tschuchnigg: [Optimization and variational principles for the shear strength reduction method](#). International Journal for Numerical and Analytical Methods in Geomechanics 45, 2021, pages 2388-2407.
- S. Sysala, J. Haslinger, B.D. Reddy, S. Repin: [An abstract inf-sup problem inspired by limit analysis in perfect plasticity and related applications](#). M3AS - Mathematical Models and Methods in Applied Sciences 31, 2021, pages 1593–1623.
- B.D. Reddy, S. Sysala: [Bounds on the elastic threshold for problems of dissipative strain-gradient plasticity](#). Journal of the Mechanics and Physics of Solids 143, 2020, 104089.
- J. Haslinger, S. Repin, S. Sysala: [Inf-sup conditions on convex cones and applications to limit load analysis](#). Mathematics and Mechanics of Solids 24, 2019, pages 3331-3353.
- M. Čermák, S. Sysala, J. Valdman: [Efficient and flexible MATLAB implementation of 2D and 3D elastoplastic problems](#). Applied Mathematics and Computation 355, 2019, pages 595-614.
- S. Sysala, R. Blaheta, A. Kolcun, J. Ščučka, K. Souček, P. Pan: [Computation of composite strength by limit analysis](#). Key Engineering Materials 810, 2019, pages 137-142.
- S. Repin, S. Sysala, J. Haslinger: [Computable majorants of the limit load in Hencky's plasticity problems](#). Computer & Mathematics with Applications 75, 2018, pages 199-217.
- S. Sysala, M. Čermák, T. Ligurský: [Subdifferential-based implicit return-mapping operators in Mohr-Coulomb plasticity](#). ZAMM 97, 2017, pages 1502-1523.

- S. Sysala, M. Čermák, T. Koudelka, J. Kruis, J. Zeman, R. Blaheta: [Subdifferential-based implicit return-mapping operators in computational plasticity](#). ZAMM 96, 2016, pages 1318-1338.
 - J. Haslinger, S. Repin, S. Sysala: [Guaranteed and computable bounds of the limit load for variational problems with linear growth energy functionals](#). Applications of Mathematics 61, 2016, pages 527-564.
 - J. Haslinger, S. Repin, S. Sysala: [A reliable incremental method of computing the limit load in deformation plasticity based on compliance: Continuous and discrete setting](#). Journal of Computational and Applied Mathematics 303, 2016, pages 156-170.
 - M. Čermák, J. Haslinger, T. Kozubek, S. Sysala: [Discretization and numerical realization of contact problems for elastic-perfectly plastic bodies](#). PART II - numerical realization, limit analysis. ZAMM 95, 2015, pages 1348-1371.
 - S. Sysala, J. Haslinger, I. Hlaváček, M. Čermák: [Discretization and numerical realization of contact problems for elastic-perfectly plastic bodies](#). PART I - discretization, limit analysis. ZAMM 95, 2015, pages 333-353.
 - O. Axelsson, S. Sysala: [Continuation Newton methods](#). Computers & Mathematics with Applications 70, 2015, pages 2621-2637.
 - M. Čermák, S. Sysala: [A TFETI Domain Decomposition Solver for Von Mises Elastoplasticity Model with Combination of Linear Isotropic-Kinematic Hardening](#). International Journal of Mechanical and Mechatronics Engineering 9, 2015, pages 571-576.
 - M. Čermák, T. Kozubek, S. Sysala, J. Valdman: [A TFETI Domain Decomposition Solver for Elastoplastic problems](#). Applied Mathematics and Computation 231, 2014, pages 634-653.
 - S. Sysala: [Properties and simplifications of constitutive time-discretized elastoplastic operators](#). ZAMM 94, 2014, pages 233-255.
 - R. Blaheta, P. Byczanski, M. Čermák, R. Hrtus, R. Kohut, A. Kolcun, J. Malík, S. Sysala: [Analysis of ASPO pillar stability experiment: Continuous TM model development and calibration](#). Journal of Rock Mechanics and Geotechnical Engineering 5, 2013, pages 124-135.
 - O. Axelsson, R. Blaheta, S. Sysala, B. Ahmad: [On the solution of high order stable time integration methods](#). Boundary Value Problems 108, 2013, 22 pages.
 - S. Sysala: [Application of a modified semismooth Newton method to some elasto-plastic problems](#). Math. Comp. Sim. 82, 2012, pages 2004-2021.
 - J. Malík, S. Sysala: [Analysis of geosynthetic tubes filled with several liquids with different densities](#). Geotextiles and geomembranes 29, 2011, pages 249-256.
 - S. Sysala: [Numerical modelling of semi-coercive beam problem with unilateral elastic subsoil of Winkler's type](#). Applications of Mathematics 55, 2010, pages 151-187.
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- S. Sysala: [Unilateral elastic subsoil of Winkler's type: Semi-coercive beam problem](#). Applications of Mathematics 53, 2008, pages 347-379.

Selected conference papers

- S. Sysala: [Advanced Continuation Methods for Limit Load and Shear Strength Reduction Methods](#). In P. Iványi, J. Kruis, B.H.V. Topping, (Editors), "Proceedings of the Twelfth International Conference on Engineering Computational Technology", Civil-Comp Press, Edinburgh, UK, Online volume: CCC 8, Paper 9.2, 2024, doi:10.4203/ccc.8.9.2
- S. Sysala: [Continuation Newton methods with applications to plasticity](#). In: Large-Scale Scientific Computations. Vol. 13952. Cham: Springer Nature Switzerland AG (Lirkov, I.; Margenov, S., eds.), p. 61-68, 2024.
- S. Sysala, F. Tschuchnigg, E. Hrubešová, Z. Michalec: [Shear strength reduction analysis and its usage in slope stability with unconfined seepage](#). In: Proceedings of the 10th European Conference on Numerical Methods in Geotechnical Engineering, (L. Zdravković, S. Konte, D.M.G. Taborda, A. Tsiamposi eds), 2023.
- S. Sysala: [Estimation of EDZ zones in great depths by elastic-plastic models](#). In: Chleboun, J., Kůs, P., Papež, J., Rozložník, M., Segeth, K. and Šístek, J. (eds.), Programs and Algorithms of Numerical Mathematics. Proceedings of Seminar. Jablonec nad Nisou, June 19-24, 2022. Institute of Mathematics CAS, Prague, 2023. pp. 229-238
- S. Sysala, E. Hrubešová, Z. Michalec, F. Tschuchnigg: [A Rigorous Variant of the Shear Strength Reduction Method and Its Usage in Slope Stability](#). In: Barla, M., Di Donna, A., Sterpi, D., Insana, A. (eds) Challenges and Innovations in Geomechanics. IACMAG 2022. Lecture Notes in Civil Engineering, vol 288. Springer, Cham, 2023.
- L. Pospíšil, S. Sysala, M. Čermák: [Spectral Projected Gradient Method for Conic Optimization in Kinematic Limit Analysis](#). AIP Conference Proceedings 2849, 310007 (2023).
- Kolcun, S. Sysala: [RTIN-based strategies for local mesh refinement](#). In: J. Chleboun, P. Kůs, P. Prikryl, M. Rozložník, K. Segeth, J. Šístek, T. Vejchodský (eds.), PANM 20: Proceedings of 20th conference, Programs and Algorithms of Numerical Mathematics, Czech Academy of Sciences, Prague, 2021, pages 59-68.
- M. Čermák, S. Sysala, J. Valdman: [On vectorized MATLAB implementation of elastoplastic problems](#). AIP Conference Proceedings 2293, 2020.
- S. Sysala, J. Haslinger, S. Repin: [Limit analysis and inf-sup conditions on convex cones](#). COMPLAS 2019 - XV International Conference on Computational Plasticity. Fundamentals and Applications. International Centre for Numerical Methods in Engineering (CIMNE), (E. Oñate, M. Chiumenti, R. Owen, D. Peric, E. de Souza Neto eds.), 2019, pages 133-144.

- S. Sysala, J. Haslinger, S. Repin: [Reliable computation and local mesh adaptivity in limit analysis](#). In J. Chleboun, P. Kůs, P. Přikryl, M. Rozložník, K. Segeth, J. Šístek, T. Vejchodský (eds.), PANM 19: Proceedings of 19th conference, Programs and Algorithms of Numerical Mathematics, Czech Academy of Sciences, Prague, 2019, pages 149-158.
 - S. Sysala: [Limit analysis problem and its penalization](#). COMPLAS 2017 - XV International Conference on Computational Plasticity. Fundamentals and Applications. International Centre for Numerical Methods in Engineering (CIMNE), (E. Oñate, R. Owen, D. Peric, M. Chiumenti eds.), 2017, pages 866-875.
 - S. Sysala, M. Čermák: [Implicit constitutive solution scheme for Mohr-Coulomb plasticity](#). In: J. Chleboun, P. Kůs, P. Přikryl, K. Segeth, J. Šístek, T. Vejchodský (eds.): Programs and Algorithms of Numerical Mathematics. Proceedings of Seminar, Institute of Mathematics CAS, Prague, 2017, pages 120-129.
 - S. Sysala, J. Haslinger: [Truncation and Indirect Incremental Methods in Hencky's Perfect Plasticity](#). In: F. dell'Isola, M. Sofonea, D. Steigmann (eds.): Mathematical Modelling in Solid Mechanics. Advanced Structured Materials, Vol. 69, Springer, Singapore, 2017, pages 265-284.
 - M. Čermák, S. Sysala: [How to simplify return-mapping algorithms in computational plasticity: Part 1 - Main idea](#). In: Computational Plasticity III - Fundamentals and Applications - COMPLAS III. Barcelona: International Center for Numerical Methods in Engineering (CIMNE), (E. Oñate eds), 2015, pages 1-12.
 - M. Čermák, S. Sysala: [How to simplify return-mapping algorithms in computational plasticity: Part 2 - Implementation details and experiments](#). In: Computational Plasticity III - Fundamentals and Applications - COMPLAS III. Barcelona: International Center for Numerical Methods in Engineering (CIMNE), (E. Oñate eds), 2015, pages 1-9.
 - R. Blaheta, R. Kohut, J. Starý, S. Sysala: *Computational and reliability aspects of micro-geomechanics*. In: Computer Methods and Recent Advances in Geomechanics: Proceedings of the 14th International Conference of International Association for Computer Methods and Recent Advances in Geomechanics (IACMAG 2014), 2014, pages 205-210.
 - T. Koudelka, J. Kruis, S. Sysala, M. Vokáč: [Modeling of damage due to shrinkage in autoclaved aerated concrete](#). In: Proceedings of the International Conference on Numerical Analysis and Applied Mathematics 2014 (ICNAAM-2014), Vol. 1648, (T. Simos, C. Tsitouras eds.), Melville, NY: AIP Publishing, 2016.
 - M. Čermák, S. Sysala: [Total-FETI method for solving contact elasto-plastic problems](#). Lecture Notes in Computational Science and Engineering. Berlin: Springer Verlag, (J. Erhel, M. Gander, L. Halpern eds.), 2014, pages 955-965.
 - S. Sysala: [On control of loading process up to the limit load in Hencky plasticity](#). In: MMOM - Mathematical Modelling and Optimization in Mechanics. Agora: University of Jyväskylä, (P. Neittaanmäki, S. Repin, T. Tuovien eds.), 2014, pages 84-87.
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- M. Čermák, J. Haslinger, S. Sysala: [*Numerical Solution of Perfect Plastic Problems with Contact: Part I - Theory and Numerical Methods*](#). In: Proceedings of the XII International Conference on Computational Plasticity - Fundamentals and Applications. Vol. 12. Barcelona: International Centre for Numerical Methods in Engineering (CIMNE), (E. Onate, D. Owen, D. Peric, B. Suárez eds.), 2013, pages 1-12.
- M. Čermák, J. Haslinger, S. Sysala: [*Numerical Solution of Perfect Plastic Problems with Contact: Part II – Numerical Realization*](#). In: Proceedings of the XII International Conference on Computational Plasticity - Fundamentals and Applications. Vol. 12. Barcelona: International Centre for Numerical Methods in Engineering (CIMNE), (E. Onate, D. Owen, D. Peric, B. Suárez eds.), 2013, pages 1-11.
- S. Sysala: *Bending of Beam with Free Ends on Non-linear Subsoil*. In: Mechanical Structures and Foundation Engineering 2010, VŠB-TU Ostrava, (K. Frydrýšek ed.), 2010, pages 1-17.
- P. Byczanski, S. Sysala: *Modified semismooth Newton method: numerical example*. In: Proc. of the Seminar SIMONA, TU Liberec, 2009, pages 24-30.

Technical reports:

- J. Březina, S. Sysala, J. Stebel, M. Béreš, S. Bérešová, P. Exner, D. Horák, J. Kružík, T. Luber: [*Posouzení vlivu EDZ na transport radioaktivních látek a bezpečnost hlubinného úložiště radioaktivního odpadu pomocí výpočetních metod*](#). Necertifikovaná metodika pro TAČR ENDORSE projekt č. TK02010118, 2023 (in Czech).

Editorials

- S. Sysala, P. Tichý: [*Editorial – Special issue on the occasion of the Seminar on Numerical Analysis*](#). Applications of Mathematics 67, 2022, pages 675-678.
 - R. Blaheta, J. Haslinger, S. Sysala, P. Arbenz, J. Kraus: [*MATCOM special issue Modelling 2019: International Conference on Mathematical Modelling and Computational Methods in Applied Sciences and Engineering*](#). Mathematics and Computers in Simulation 189, 2021, pages 1-2.
 - S. Sysala, P. Tichý: [*Editorial – Special issue on the occasion of the Seminar on Numerical Analysis*](#), 21. -25. 1. 2019, Ostrava, Czech Republic. Application of Mathematics 65, 2020, pages 121-122.
 - M. Rozložník, S. Sysala: [*Editorial – Special issue on the occasion of the Seminar on Numerical Analysis*](#), 30.1.-3.2.2017, Ostrava, Czech Republic. Applications of Mathematics 62, 2017, pages 535-536.
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Software and codes

- <https://github.com/sysala/SSRM> - Matlab codes on the shear strength reduction method and its usage in geotechnical stability analysis, 2024
- https://github.com/sysala/Matlab_nonlinear_elasticity_3D_FEM_quasi-Newton_DCG - Matlab codes on Quasi-Newton Iterative Solutions for Non-linear Elasto-Plastic Problems, 2024
- J. Březina, J. Stebel, P. Exner, M. Špetlík, S. Sysala, S. Běřešová, D. Horák, J. Kružík, D. Flanderka, R. Srb, M. Běřeš: [Software Endorse](#). Software output for TAČR ENDORSE project No. TK02010118, 2023.
- M. Čermák, S.Sysala, J.Valdman, MatlabFEMpackageforelastoplasticity, 2018, https://github.com/matlabfem/matlab_fem_elastoplasticity

Other publications

- D. Sysalová, S. Sysala: Owe Axelsson (1934-2022). *Pokroky matematiky, fyziky a astronomie* 67 (2022), pages 192-194 (in Czech).
 - S. Sysala: [Laudation for the 70th birthday of Professor Radim Blaheta](#). *Mathematics and Computers in Simulation* 189, 2021, pages 3-4.
 - S. Sysala: *Linear elasticity problem: analysis and solution*. Textbook for VSB-TU Ostrava, 2020, 37 pages.
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