

CURRICULUM VITAE

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Current affiliations

Research Scientist, NORCE Norwegian Research Centre AS, Norway, Jan 2022 –.

Sensor, University of Bergen, Norway, Nov 2021 –.

Previous work experience

Postdoctoral Researcher, NORCE Norwegian Research Centre AS, Norway, Aug 2019 – Dec 2021.

Teaching assistant in Introduction to Computing and Quantum Information, UNAM, Mexico, 2014.

Teaching assistant in Analytical Mechanics, UNAM, Mexico, 2014.

Teaching assistant in Electromagnetism, UNAM, Mexico, 2013.

Teaching assistant in Computational Physics, UNAM, Mexico, 2012.

Education

Ph.D. in **Applied Mathematics**, University of Bergen, Norway, June 2019.

Supervisors: Prof. Dr. Florin Radu, Prof. Dr. Sorin Pop, and Prof. Dr. Kundan Kumar.

Thesis title: Mathematical Modeling of Microbial Enhanced Oil Recovery with Focus on Bio-Plug Technology: From the Pore to the Core Scale.

M.Sc. in **Applied Mathematics**, University of Bergen, Norway, 2016.

Supervisors: Prof. Dr. Florin Radu and Prof. Dr. Jan Nordbotten.

Thesis title: Modeling and Simulation of Microbial Enhanced Oil Recovery: A New Approach which Includes the Role of Interfacial Area.

B. in **Mathematics**, National Autonomous University of Mexico (UNAM), Mexico, 2015.

Supervisor: Prof. Dr. Jorge Fujioka Rojas.

Thesis title: Un Teorema de Noether Fraccionario (A Fractional Noether's Theorem).

B. in **Physics**, National Autonomous University of Mexico (UNAM), Mexico, 2013.

Digital System Technician, Instituto Politécnico Nacional (IPN), Mexico, 2009.

Awards

Best poster presentation at SIAM Conference on Mathematical and Computational Issues in the Geosciences at Friedrich-Alexander University Erlangen-Nürnberg, Germany, 2017.

Medal Gabino Barreda (best student in Physics, generational award), UNAM, Mexico, 2016.

Mención Honorífica (graduated with honors), UNAM, Mexico, 2015.

Bronze Medal, XIV Iberoamerican Physics Olympiad, Chile, 2009.

First Place, Physics Academic Meeting “Interpolitécnico”, IPN, Mexico, 2009.

Gold Medal, XIX National Physics Olympiad, Sociedad Mexicana de Física, Mexico, 2008.

Funding record

Meltzer project grant, mobility funds for travel, 14,982 NOK, 2019.

BFS project “Pure mathematics in Norway”, mobility funds for travel, 24,808 NOK, 2018.

Meltzer project grant, mobility funds for travel; 15,750 NOK, 2018

Academia agreement, mobility funds for travel; 13,500 NOK, 2018

Academia agreement, mobility funds for travel; 10,918 NOK, 2016.

Conferences

Talk at SIAM Conference on Mathematical and Computational Issues in the Geosciences, Bergen, Norway, 2023.

Talk at CMWR, Gdańsk, Poland, 2022.

Talk at the 2nd EAGE Geoscience and Engineering for the Energy Transition Conference, Online, 2021.

Plenary talk at MRST Symposium, Oslo, Norway, 2021.

Talk at Trondheim Conference on CO₂ Capture, Transport and Storage, Trondheim, Norway, 2021.

Talk at SIAM Conference on Mathematical and Computational Issues in the Geosciences, Milano, Italy, 2021.

Talk at CMWR, California, USA, 2020.

Talk at InterPore, Tsingtao, China, 2020.

Poster presentation at InterPore, Valencia, Spain, 2019.

Talk at SIAM Conference on Mathematical and Computational Issues in the Geosciences, Texas, USA, 2019.

Poster presentation at the National Meeting of Mathematicians, Bergen, Norway, 2018.

Poster presentation at the International Congress of Mathematicians, Río de Janeiro, Brazil, 2018.

Poster presentation at the Annual Meeting of the Society for Mathematical Biology and the Japanese Society for Mathematical Biology, Sydney, Australia, 2018.

Talk at European Conference on Numerical Mathematics and Advanced Applications, Voss, Norway, 2017.

Poster presentation at SIAM Conference on Mathematical and Computational Issues in the Geosciences, Erlangen-Nürnberg, Germany, 2017.

Poster presentation at 19th European Symposium on Improved Oil Recovery, Stavanger, Norway, 2017.

Workshops

CEMRACS hackathon on Scientific Machine Learning, Marseille, France, 2023.

OPM summit at Trondheim, Norway, 2022.

INSPIRE workshop at Porquerolles, France, 2022.

FluidFlower benchmark workshop at Bergen, Norway, 2022.

INSPIRE workshop at Geilo, Norway, 2022.

2nd Workshop on computational aspects of perfusion and flow in live tissue, at University of Bergen, Norway, 2017.

Qualitative and numerical aspects of mathematical modelling at Western Norway University of Applied Sciences, Norway, 2017.

Modeling and Benchmarking of fractured porous media: flow, transport and deformation at University of Bergen, Norway, 2017.

Schools/Visits

Summer school on Scientific Machine Learning, Marseille, France, 2023.

Summer school on simulation software development using DUNE, DuMuX, OPM and PorePy at the Dr. Holms Hotel (Geilo), Norway, 2019.

Summer school on phase field modeling at University of Hasselt, Belgium, 2019.

Summer school on upscaling techniques for mathematical models involving multiple scales at University of Hasselt, Belgium, 2017.

Student tour, Non-linearities and Upscaling in PoroUS Media (NUPUS), Italy and Germany, 2017.

Student tour, Non-linearities and Upscaling in PoroUS Media (NUPUS), USA, 2015.

IV School in Physics of Nanostructures at Center for Nanoscience and Nanotechnology (Ensenada), Mexico, 2013.

XXI Summer school in Physics at Institute of Physics (UNAM), Mexico, 2013.

Advanced Summer school in Physics, CINVESTAV-IPN, Mexico, 2012.

XX Summer school in Physics at Institute of Physics (UNAM), Mexico, 2012.

Advising

Co-advised one master student.

Professional service

Active reviewer of international journals (Advances in Water Resources, AIChE Journal, Canadian Journal of Microbiology, Computational Geosciences, Energies, Hydrological Sciences Journal, International Journal of Greenhouse Gas Control, Journal of Hazardous Materials, Petroleum Science and Technology). I have also reviewed papers in: proceedings of Finite Volumes for Complex Applications IX, proceedings of Numerical Mathematics and Advanced Applications ENUMATH 2017.

Research interests

Flow in porous media: multi-phase systems, non-standard models, reactive transport.

Mathematical modeling: microbial enhanced oil recovery (MEOR), microbially induced calcite precipitation (MICP), geological carbon capture, utilization, and storage (CCUS).

Model inputs and outputs: parameter calibration, sensitivity analysis, optimization techniques.

Open-source software development: open porous media initiative (OPM), MATLAB reservoir simulation toolbox (MRST).

Upscaling: homogenization, asymptotic expansions.

Languages

Spanish (Mother tongue), English (Fluent), Norwegian (B1).

Programming languages

C++, MATLAB/GNU Octave, Python

Main GitHub repositories

<https://github.com/daavid00/ad-micp>

<https://github.com/daavid00/expresscs>

<https://github.com/daavid00/pymm>

<https://github.com/daavid00/pyopmnearwell>

<https://github.com/opm/pyopmspe11>

Publications

No. of publications: Submitted: 1; In journals: 10; Book chapters/proceedings: 6.

Submitted

- [1] Tveit, S. and Landa-Marbán, D. Field-scale optimization of injection strategies for leakage mitigation using microbially induced calcite precipitation. **Submitted to Computational Geosciences**. <https://doi.org/10.13140/RG.2.2.22042.16324>.

Journal articles

- [2] Liu, N., Haugen, M., Benali, B., Landa-Marbán, D., Fernø, M.A., 2023. Pore-scale kinetics of calcium dissolution and secondary precipitation during geological carbon storage. *Chem. Geol.* **641**, 121782. <https://doi.org/10.1016/j.chemgeo.2023.121782>.
- [3] Liu, N., Haugen, M., Benali, B., Landa-Marbán, D., Fernø, M.A., 2023. Pore-scale spatiotemporal dynamics of microbial-induced calcium carbonate growth and distribution in porous media. *Int. J. Greenhouse Gas Control* **125**, 103885. <https://doi.org/10.1016/j.ijggc.2023.103885>.
- [4] Kassa, A.M., Gasda, S.E., Landa-Marbán, D., Sandve, T.H., Kumar, K., 2021. Field-scale impacts of long-term wettability alteration in geological CO₂ storage. *Int. J. Greenhouse Gas Control* **114**, 103556. <https://doi.org/10.1016/j.ijggc.2021.103556>.
- [5] Landa-Marbán, D., Tveit, S., Kumar, K., Gasda, S.E., 2021. Practical approaches to study microbially induced calcite precipitation at the field scale. *Int. J. Greenhouse Gas Control* **106**, 103256. <https://doi.org/10.1016/j.ijggc.2021.103256>.
- [6] Landa-Marbán, D., Bødtker, G., Vik, B.F., Pettersson, P., Pop, I.S., Kumar, K., Radu, F.A., 2020. Mathematical modeling, laboratory experiments, and sensitivity analysis of bioplug technology at Darcy scale. *SPE J.* **25** (6), 3120–3137. <https://doi.org/10.2118/201247-PA>.
- [7] Landa-Marbán, D., Bødtker, G., Kumar, K., Pop, I.S., Radu, F.A., 2020. An upscaled model for permeable biofilm in a thin channel and tube. *Transp. Porous Med.* **132**, 83–112. <https://doi.org/10.1007/s11242-020-01381-5>.
- [8] Landa-Marbán, D., Liu, N., Pop, I.S., Kumar, K., Pettersson, P., Bødtker, G., Skauge, T., Radu, F.A., 2019. A pore-scale model for permeable biofilm: Numerical simulations and laboratory experiments. *Transp. Porous Med.* **127** (3), 643–660. <https://doi.org/10.1007/s11242-018-1218-8>.
- [9] Liu, N., Skauge, T., Landa-Marbán, D., Hovland, B., Thorbjørnsen, B., Radu, F.A., Vik, B.F., Baumann, T., Bødtker, G., 2019. Microfluidic study of effects of flow velocity and nutrient concentration on biofilm accumulation and adhesive strength in the flowing and no-flowing microchannels. *J. Ind. Microbiol. Biotechnol.* **46**, 855–868. <https://doi.org/10.1007/s10295-019-02161-x>.

- [10] Landa-Marbán, D., Radu, F.A., Nordbotten, J.M., 2017. Modeling and simulation of microbial enhanced oil recovery including interfacial area. *Transp. Porous Med.* **120** (2), 395–413. <https://doi.org/10.1007/s11242-017-0929-6>.
- [11] Landa-Marbán, D., Bietenholz, W., Hip, I., 2014. Features of a 2d gauge theory with vanishing chiral condensate. *Int. J. Mod. Phys. C* **25** (10), 1450051. <https://doi.org/10.1142/S012918311450051X>.

Book chapters and conference proceeding

- [12] Landa-Marbán, D., Kumar, K., Gasda, S.E., Sandve, T.H., Kassa, A.M. Numerical studies of long-term wettability alteration effects in CO₂ storage applications. *Eur. Assoc. Geosci. Eng.* **2021** <https://doi.org/10.3997/2214-4609.202121081>.
- [13] Landa-Marbán, D., Kumar, K., Tveit, S., Gasda, S.E. Numerical studies of CO₂ leakage remediation by MICP-based plugging technology. In *Short Papers from the 11th International Trondheim CCS conference* (ed. Røkke, N.A. & Knuutila, H.K.), ISBN: 978-82-536-1714-5, 284-290. <https://hdl.handle.net/11250/2786420>.
- [14] Tveit, S., Pettersson, P., Landa-Marbán, D., 2020. Optimizing sealing of CO₂ leakage paths with microbially induced calcite precipitation under uncertainty. *Eur. Assoc. Geosci. Eng.* **2020** <https://doi.org/10.3997/2214-4609.202035087>.
- [15] Landa-Marbán, D., Pop, I.S., Kumar, K., Radu, F.A., 2019. Numerical simulation of biofilm formation in a microchannel. In *Numerical Mathematics and Advanced Applications ENUMATH 2017* (ed. Radu, F.A., Kumar, K., Berre, I., Nordbotten, J.M. & Pop, I.S.), **126**, 799–807, Springer International Publishing, Cham. https://doi.org/10.1007/978-3-319-96415-7_75.
- [16] Landa-Marbán, D., Radu, F.A., Nordbotten, J.M., 2017. A non-standard model for microbial enhanced oil recovery including the oil-water interfacial area. *Eur. Assoc. Geosci. Eng.* **2017**. <https://doi.org/10.3997/2214-4609.201700254>.
- [17] Bietenholz, W., Hip, I., Landa-Marbán, D., 2014. Spectral properties of a 2d IR conformal theory. *PoS LATTICE* **2013**, 486. <https://doi.org/10.22323/1.187.0486>.