DR. ARTUR CASTIEL REIS DE SOUZA

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Scientific Programmer & Expert in CFD for Porous Media
Find more information at my website: arturcastiel.github.io

ABOUT

Specialist in Computational Fluid Dynamics for multiphase flow on subsurface porous media. Skilled in scientific programming and reservoir modeling with a track record of delivering high quality results. Experienced developing state of the art technology in the fields of Grid Generation and Adaptation, Numerical Methods, Linear Non-linear Flux Approximation, Multiscale Methods, Fractured Media Modeling. Easy going with excellent communication skills.

EXPERIENCE

DELFT INSTITUTE OF TECHNOLOGY
Post-Doctoral Researcher - Delft, Netherlands –
Since 2022

- Current main developer of in-house MATLAB simulator DARSim. Developed unstructured grid module for Underground Carbon Capture Storage simulation using Embedded Discrete Fracture Models (EDFM and pEDFM).

UNIVERSIDADE TIRADENTES
Assistant Lecturer **–** Recife, Brazil, First Semester 2022
Subject: Dynamic Modelling and Heat Transfer disciplines.

UNIVERSIDADE FEDERAL DE PERNAMBUCO
PhD Researcher - Recife, Brazil – 2018 to 2022

- Creator and main developer of in-house Python simulator. Developed consistent Multiscale Finite Volume method to speed up simulation on unstructured grids. Development of linear and nonlinear flux approximation schemes. Managed and trained a team with 3 undergraduate students involved in the project.

SWANSEA UNIVERSITY
Visiting PhD Researcher - Collaboration between Brazil and UK Research Groups

Swansea, United Kingdom- 2020 to 2021

- Developed of a general-purpose grid generation algorithm for the creation unstructured dual meshes of Multiscale.

UNIVERSIDADE FEDERAL DE PERNAMBUCO
MSc Researcher – Recife, Brazil – 2015 to 2018

- Development of a two-phase flow simulator based on a IMPES strategy using Multiscale Finite Volume method as an approximate pressure solver.

FACULDADE MAURICIO DE NASSAU
Instructor – Recife, PE, Brazil, 2014 to 2015
Subjects: CAD/CAM, Auto Cad, Introduction to Programming, and Computer Networks.

EDUCATION

UNIVERSIDADE FEDERAL DE PERNAMBUCO
Recife, Pernambuco - Brazil – 2018 to 2022
PhD in Civil Engineering - GPA 4.0/4.0
SWANSEA UNIVERSITY
Visiting PhD Student
Swansea, Wales, United Kingdom – 2020 to 2021
2021
UNIVERSIDADE FEDERAL DE PERNAMBUCO
 Recife, PE - Brazil – 2015 to 2018,
 MSc in Civil Engineering - GPA 3.9/4.0
UNIVERSIDADE DE PERNAMBUCO
Recife, PE - Brazil – 2006 to 2012
BSC in Mechanical Mechatronics Engineering,

AWARDS

- ABMEC Award for Best Doctoral Thesis of the Year - Honorable Mention, Brazilian Association for Computational Methods in Engineering.
- i-LITPEg Award - Award for Best Thesis of the Year 2023, Brazil, Institute of Petroleum and Energy Research.
- PhD scholarship, Energi Simulation Foundation.
- Visiting PhD student in Swansea University, National Council for Scientific and Technological Development (CNPq).

SKILLS

Scientific Programming: MATLAB, Python, Numpy, Scipy, C/C++, Object-oriented and Array programming, Git, Latex, Linux,Visit, ParaView, Inkscape, GIMP
Technology: Docker, Raspberry Pi, Ubuntu, HTML, CSS, Bootstrap, Javascript.Autodesk AutoCad, Autodesk Inventor, Microstation, Ansys
Languages: Native Portuguese Speaker, Fluent in English, Advanced French and Spanish, and Intermediary German skills.

VOLUNTEER WORK

Engaged in diverse volunteer initiatives focusing on humanitarian aid and community development in Brazil.

- GADE founding member: Development of projects aimed at addressing social and economic challenges of refugee and poor communities in Brazil and Haiti.
- Rotaract Club Recife, Recife, Brazil: Participated in community service projects focused on local and international humanitarian needs.
- AIESEC – Recife, Brazil: Contributed to youth development and cultural exchange programs, fostering global understanding and cooperation.

RELEVANT PUBLICATIONS

- Cavalcante, T.M.; **Souza, A. C. R**.; Hajibeygi, H; Carvalho , D. K. E.; Lyra, P. R. M.; Simulation of Two-Phase Flow in 3D Fractured Reservoirs Using a Projection-Based Embedded Discrete Fracture Model on Unstructured Tetrahedral Grids (pEDFM-U) , Advances in Water Resources (2024)
- **Souza, A. C. R.**; Carvalho, D. K. E.; Cavalcante, T.M.; Contreras, F. R. L.; Edwards, M. G.; Lyra, P. R. M.; A nonlinear repair technique for the MPFA-D scheme in single-phase flow problems and heterogeneous and anisotropic media, Journal of Computational Physics (2024)
- Santos, J. C. A.; Lyra, P. R. M.; Andrade, J. P. R.; **Souza, A. C. R**.; Lira Filho, R. J. M.; Carvalho, D. K. E.; An Algebraic Dynamic Multilevel and Multiscale Method with Non-Uniform Mesh Resolution and Adaptive Algebraic Multiscale Solver Operator for the Simulation of Two-Phase Flows in Highly Heterogeneous Petroleum Reservoirs, Journal of Computational Physics (2022)
- **Souza, A. C. R.**; Carvalho, D. K. E.; Santos, J. C. A.; Willmersdorf, R. B.; Lyra, P. R. M.; Edwards, M. G. An algebraic multiscale solver for the simulation of two-phase flow in heterogeneous and anisotropic porous media using general unstructured grids (AMS-U) , Applied Mathematical Modelling (2022)
- **Souza, A. C. R.**; Barbosa, L. M. C.; Contreras, F. R. L.; Lyra, P. R. M.; Carvalho, D. K. E. A multiscale control volume framework using the multiscale restriction smooth basis and a non-orthodox multi-point flux approximation for the simulation of two-phase flows on truly unstructured grids, Journal of Petroleum Science and Engineering (2020)
- Silva, R.N.T.; MATOS, G. M.; **Souza, A. C. R.;** LIRA FILHO, R. J. M.; Carvalho, D. K. E. de; Lyra, P. R. M., . Some Results on the Accuracy of a Classical Upscaling Technique Using an Intuitive Mul-tilevel Preprocessor for Smart Simulation, CILAMCE (2020) - Ibero-Latin American Congress on Computational Methods in Engineering
- Santos, J. C. A.; Andrade, J. P. R.; **Souza, A. C. R**.; Lira Filho, R. J. M.; Carvalho, D. K. E. de; Lyra, P R M An Adaptive Algebraic Dynamic Multilevel (A-ADM) and Multiscale Method with Enriched Basis Functions for the Simulation of Two-Phase Flows in Highly Heterogeneous Petroleum Reservoirs, CILAMCE (2020) - Ibero-Latin American Congress on Computational Methods in Engineering