**ARTUR CASTIEL REIS DE SOUZA**

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**EDUCATION**

Universidade federal de pernambuco Recife, PE - Brazil

PhD in Civil Engineering (Estimate End) June 2022

Thesis topic: Computational fluid dynamics applied to fluid flow in porous media, such as petroleum and subsurface water reservoirs, in particular, the development of linear and non-linear Finite Volume and Multiscale Finite Volume schemes for unstructured grids.

Advisor: Paulo R. M. Lyra, PhD

Co-advisor: Darlan K. E. de Carvalho, PhD

SWANSEA UNIVERSITY Swansea, Wales – United Kingdom

Visiting PhD Student February 2020 to February 2021

Visit Purpose: The development of a general purpose algorithm for the creation unstructured dual meshes using techniques of computational and the development repair techniques to ensure the discrete maximum principle and eliminate spurious oscillation from linear Multi-Point Flux Approximation schemes.

Advisor: Michael G. Edwards, PhD

Universidade federal de pernambuco Recife, PE - Brazil

Master’s Degree in Civil Engineering January 2019

Thesis topic: Multiscale Finite Volume for the simulation of two-phase flow in unstructured grids using Multi-Point Flux Approximation schemes.

Advisor: Paulo R. M. Lyra, PhD

Co-advisor: Darlan K. E. de Carvalho, PhD

Universidade de pernambuco Recife, PE - Brazil

Bachelor's degree in Mechanical Engineering minor in Mechatronics May 2012

**AWARDS**

PhD scholarship, Energi Simulation Foundation, (Funding No. 53/2020), 2022

PhD scholarship, Science Support Foundation of the State of Pernambuco (FACEPE), (IBPG-0017-3.01/18 Institution), 2018-2022

Visiting PhD student in Swansea University, National Council for Scientific and Technological Development (CNPq) (201099/2019-5), 2020

Master’s scholarship, Science Support Foundation of the State of Pernambuco, (IBPG-0396-3.01/15.), 2015-2018

**RESEARCH INTERESTS**

Computational Fluid Dynamics, Fluid Flow in Porous Media, Petroleum Reservoir Simulation, Grid Generation and Adaptation, Numerical Methods: Linear and Non Linear CVD-MPFA Finite Volume, Finite Elements, Mixed Finite Elements, Multiscale Finite Volumes Methods.

**professional experience**

mÁQUINAS PIRATININGA Recife, PE - Brazil

Engineer, Project and Budget Department March 2012 – April 2014

Responsible for elaborating 3d models and 2d drawings for detailing and manufacturing, estimating and elaborating bill of materials of equipment such as kilns, sugar dryer, vacuum pans, painting cabinets, elaborating and translating technical and commercial proposals into English and Portuguese, negotiating and interfacing with international clients in upcoming projects. Technical support for trainees and supervisors. Interfacing between engineering department and production.

**tECHNICAL sKILLS**

**Used recently or for a long period of time**

* MATLAB, Python, Numpy, Scipy, Git, Visual Studio, Latex, Windows
* Visit, Inkscape, GIMP
* Object-oriented and Array programming

**Used in past projects or used sporadically**

* C/C++ (2 years in academic projects during bachelor’s degree), Microcontroller ASM 8051, PIC 16F8, Docker, Raspberry P , Ubuntu
* HTML, CSS, Bootstrap, Javascript
* Autodesk AutoCad, Autodesk Inventor, Microstation, Ansys

**LANGUAGES**

Native Portuguese Speaker, Fluent in English (IELTS score 7.5/9), Advanced French and Spanish, and Intermediary German skills.

**PERSONAL PROJECTS**

**Intuitive Multilevel Preprocessor for Smart Simulation – IMPRESS (https://github.com/padmec-reservoir/impress)**  
The IMPRESS is an intuitive Python pre-processor devised to make multiscale and multilevel simulation straightforward. It uses objected oriented programming to create a data structure that encapsulates information, to allow meshes properties to be easily accessed from any mesh level. The IMPRESS was envisioned, designed and created by me to aid 3-D simulation. IMPRESS has been used by over 20 students at PADMEC (https://zumbi.padmec.org/sitepadmec/pt/) research group enabling all types of research.

**JoURNAL Publications**

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, To appear in 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)](https://doi.org/10.1016/j.apm.2021.11.017) , 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](https://doi.org/10.1016/j.petrol.2019.106851), Journal of Petroleum Science and Engineering (2020)

**IN PROCEEDINGS**

Souza, A. C. R.; Cavalcante, T. M.; Carvalho, D. K. E.; Lyra, P. R. M., Edwards, M.G. [Numerical Simulation of the Diffusion Equation Via a Non-Linear Flux Splitting Technique with the Multipoint Flux Approximation Method with a Diamond Stencil Satisfying the Discrete Maximum Principle Using 2-D Unstructured Meshes](https://www.researchgate.net/publication/357067231_Numerical_Simulation_of_the_Diffusion_Equation_Via_a_Non-Linear_Flux_Splitting_Technique_with_the_Multipoint_Flux_Approximation_Method_with_a_Diamond_Stencil_Satisfying_the_Discrete_Maximum_Principle_) , COBEM (2021) - Proceedings of the 26th International Congress of Mechanical Engineering

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

Juvito, L.B. ; Ramirez, G. G. ; Souza, A. C. R. ; Carvalho, D. K. E. de ; Lyra, P. R. M. An iterative MsCV method coupled to the high-resolution CPR approach via different solution smoothers for the simulation of oil-water flows in 2D petroleum reservoirs on unstructured grids. , CILAMCE (2020) - Ibero-Latin American Congress on Computational Methods in Engineering

Souza, A. C. R.; Barbosa, L. M. C.; Carvalho, D. K. E.; Lyra, P. R. M. A MsCV framework using a non-orthodox MPFA-D for the simulation of two-phase flows on truly unstructured grids , CILAMCE (2017) - Ibero-Latin American Congress on Computational Methods in Engineering

Barbosa, L. M. C.; Souza, A. C. R., Antunes, A. A. E.; Carvalho, D. K. E.; Lyra, P. R. M. Um método iterativo multiescala modificado para volume de controle para reservatórios muito iterativos , CILAMCE (2017) - Ibero-Latin American Congress on Computational Methods in Engineering

**Teaching experience**

UNIVERSIDADE TIRADENTES Recife, PE - Brazil

Assistant Lecturer since February 2022

Subject: Dynamic Modelling and Heat Transfer disciplines

UNIVERSIDADE DE PErnAMBUCO Recife, PE - Brazil

Assistant Lecturer August 2017 – December 2017

Subject: Electricity and Electromagnetic Physics disciplines

Faculdade maurício de nassau Recife, PE - Brazil

Instructor, Telecommunications Technician Course August 2014 – July 2015

Subjects: CAD/CAM, Auto Cad, Introduction to Programming, and Computer Networks