

Alejandro Cardona Ramirez

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I. EDUCATION

Ph.D. (2020)	Energy Resources and Petroleum Engineering	KAUST, Saudi Arabia
MSc. (2016)	Earth Sciences and Engineering	KAUST, Saudi Arabia
BSc. (2015)	Petroleum Engineering	UNAL, Colombia

II. EMPLOYMENT

11/2020-Present	Postdoctoral Fellow	UT Austin, USA
08/2015-Present	Graduate Research Assistant	KAUST, Saudi Arabia
07/2014-01/2015	Wellbore Stability Intern	Equion Energia, Colombia
08/2013-06/2014	Research Assistant	UNAL, Colombia

III. PUBLICATIONS

Theses

- Cardona A. (2019). Fluid Transport in Fractured Carbonate Rocks, PhD Dissertation, KAUST, expected to defend in May 2020
- Cardona A. (2014). Software Construction to Generate Mechanical Earth Models from Well Logs, Engineering Thesis, UNAL (Universidad Nacional de Colombia), Colombia (in Spanish)

Publications

- Cardona A. and Santamarina J.C. (2020), Carbonate rocks: Matrix permeability estimation, *AAPG Bulletin*, v.104 (1), p 131-144 doi: 10.1306/05021917345
- Santamarina J.C., Park J., Terzariol M., Cardona A., Castro G., Cha W., Garcia A., Hakiki F., Lyu C., Salva-Ramírez M., Shen Y., Sun Z., Chong S.H. (2019). Soil Properties: Physics Inspired, Data Driven, in: Lu N., Mitchell J. (eds) *Geotechnical Fundamentals for Addressing New World Challenges*, Springer Series in Geomechanics and Geoengineering, Springer, doi: 10.1007/978-3-030-06249-1_3
- Araujo E., Alzate, G., Arbelaez A., Cardona A., Pena S., Naranjo A. (2014). Analytical Prediction Model of Sand Production Integrating Geomechanics for Open Hole and Cased Hole – Perforated Wells. SPE 171107-MS. *Conference Paper presented at SPE Heavy and Extra Heavy Oil Conference: Latin America*, Medellin, Colombia, 24-26 September

Publications in Preparation (based on completed research)

- Cardona A., Finkbeiner T., Santamarina J.C., Hydro-Mechanical Response of Single Fractures
- Cardona A., Santamarina J.C., A Simple Device to Measure Matrix Permeability
- Cardona A., Finkbeiner T., Santamarina J.C., Numerical Study of Fractured Reservoirs: Hydromechanical Analysis of the Permeability Tensor
- Cardona A., Santamarina J.C., Multiphase Flow in Fractured Media using Micromodels
- Cardona A., Santamarina J.C., Numerical Study of Capillary Pressure Curves for Single Fractures

IV. RESEARCH BACKGROUND – DEVICES AND METHODS

Experimental Device – Development

(contributed in initiating/developing experimental hardware for laboratories)

- Matrix permeameter for unjacketed specimens
- Torsional shear and radial flow for pre-fractured specimens
- Large scale 2D flow sandbox model with optical measurements
- Micromodel fabrication using soft lithography with pressure and optical instrumentation

Rock Physics and Geomechanics – Testing Experience

- Permeability measurement: (a) Gas-corrected permeability, (b) Liquid permeability under confining
- Porosity measurement: (a) Helium expansion, (b) Gravimetric, (c) Gas sorption
- High Pressure High Temperature Core Flooding
- High Pressure High Temperature Triaxial System
- High Pressure High Temperature Contact Angle and Interfacial Tension
- Mercury Intrusion Porosimetry (MICP)
- Surface Topography by Interferometry
- Rock Specimen Preparation: core plugging, polishing, core slabbing

Scientific Instruments

- X-ray Diffractometer (Rigaki Miniflex at EGEL Laboratory)
- X-Ray Tomography (Tescan XRE)
- Nuclear Magnetic Resonance (Oxford Instruments, 12 MHz)
- Scanning Electron Microscopy SEM (Quanta 600 at KAUST Corelab)
- Gas Sorption Specific Surface (Micromeritics ASAP 2420)
- Mercury Porosimeter (Micromeritics AutoPore IV)
- White Light Interferometer (Nanovea ST400 and Nanovea JR25)
- Soft Lithography: Mask Maker (Heidelberg μ PG501), Mask Aligner (EVG 6200), Plasma Cleaner (Plasma Etch PE-50)

Experimental Devices

- Laboratory electronic equipment: DC power supply, A/D board (data-logger), multimeter
- Sensors: pressure transducer, thermocouple, LVDT, strain-gauge
- General laboratory devices: pressure regulator, cooler, electronic circuits
- Machine shop: drill press, mill, polisher and multipurpose pipe and rod cutter

Analytical and Numerical Studies

- Petroleum engineering software: GMI-Suite, Fracman, CMG, Eclipse, Petrel, Interactive Petrophysics, Fracman, Techlog, Matlab Reservoir Simulation Tool MRST
- FEM Software: COMSOL
- Image visualization: ImageJ
- Drawing and CAD software: Solidworks, AutoCAD
- High level programming languages: Matlab, Mathcad, Mathematica

V. RESEARCH PROJECTS

Grants

- Hydromechanical Response of Fractured Carbonates
Period: 2016.10~2019.9 (344,890 USD)
Source: ARAMCO-EXPEC ARC
PIs: Dr. J. Carlos Santamarina and Dr. Thomas Finkbeiner

VI. TEACHING EXPERIENCE

Teaching Assistantship

- Experimental Methods for Research & Digital Signal Processing, *Summer 2020*, KAUST
- Rock Mechanics for Energy Geo-Engineering, *Fall 2019*, KAUST
- Well logging, *Spring and Fall 2013*, UNAL

Oral Presentation

- Capillarity vs. Saturation in Fracture-Matrix Systems. *InterPore 2020, Online Format*
- Numerical Study of Fractured Reservoirs: Hydromechanical Analysis of the Permeability Tensor. *4th EAGE Workshop on Naturally Fractured Reservoirs, 2020, Ras Al Khaimah, United Arab Emirates*

Poster Presentation

- The Hydro-Mechanical Response of a Single Carbonate Fracture. *International Petroleum Technology Conference IPTC, 2020, Dhahran, Saudi Arabia*
- Matrix Permeability in Carbonate Rocks. *KAUST Research Conference: Recovery of Difficult Hydrocarbons, 2018, Thuwal, Saudi Arabia*

VII. SERVICE

Membership in Professional Organizations

- Student Member, Society of Petroleum Engineers (SPE)
- Student Member, American Association of Petroleum Geologists (AAPG)
- Student Member, European Association of Petroleum Geoscientists (EAGE)

Conference Organization

- Technical support and organization of the proceedings in form of annotated slides, *KAUST Athenaeum on Dissolution and Precipitation Implications for Energy Geo-Engineering, Feb 2016*

Campus Service

- Member, Football Student Association, KAUST
- Member, Golf Student Association, KAUST

VIII. OTHERS

Certificates

- Laboratory Safety Trainings: chemical spills, cleanroom, compressed gas, emergency incident preparedness, fume hood, hazardous waste, laser, liquid nitrogen, pressurized vessel, radiation (KAUST)

Languages

- Spanish (native speaker)
- English (full proficiency)

IX. HONORS AND AWARDS

- 08/2015 – Present KAUST Fellowship for MS and PhD studies
- 01/2015 Fellowship 4th Annual International Poster Research Competition
- 09/2013 1st Place in Petro Cup SPE. XV Colombian Congress of Oil and Gas