PARTHA PRATIM MANDAL, PhD Candidate
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Career Profile:

Final year PhD candidate with dedication for future development of techniques for clean energy production and storage and monitoring. Decisive leadership and practical solution driven mindset who is keen to learn and contribute for scientific advancement and growth of the organization on experimental and computational geomechanics. Developed a full scale **geomechanical characterization workflow** of unconventional gas shale from laboratory to field stimulation scale by interlinking mechanical and elastic properties, in-situ stress state, elastic anisotropy, brittleness index and hydraulic fracturing simulation of the Goldwyer shale formation in the Canning Basin. Build 3-D geomechanical model on Pluto and Ichthys gas field, NWS to understand wellbore stability and drilling challenges and provide effective solution for risk mitigation. Practical experience of project management, report writing, and stakeholder engagement and seismic imaging workflow achieved through various practical projects for different global oil & gas company. Worked for six years as Project Geophysicist at DUG/PGS.

Education

PhD | Petroleum Engineering 2018 - Current
WASM, Curtin University, WA

- Good academic standing
- Recipient of multiple scholarship and student awards
- Peer reviewer at Geophysics, AAPG, and Energies Journal

M.Sc. Tech. | Applied Geophysics *2008 -2011*
Indian Institute of Technology (Indian School of Mines), Dhanbad, India

- First class with CGPA of 8.38/10
- Dissertation thesis on *"Fracture identification and its evaluation from borehole image logs"*

BSc Honours| Physics *2005 - 2008*
Presidency college, University of Calcutta, India

- First class distinction

Key Skills and Strengths

- Practical project driven three and half years' experience in **geomechanical modelling and characterization** from near surface to deep earth achieved from PhD research work in **subsurface resource sector**
- **Effective** written and oral **communication** via project handling, proactive interaction, journal article/report writing, conference presentation and direct reporting through email, presentation and stakeholder engagement
- Ability to **embrace creative ideas and new ambitious voices** within organization and service delivery accumulated over last three year's **critical thinking and solution focus mindset** as PhD candidate at Curtin University

- Microstructure investigation capabilities with Helium Pycnometer, CT-scan, Permeability, NMR, SEM, LPNA
- Implemented **improvement of case study supported geomechanics** tutorial for undergraduate course and supported 40+ undergraduate and 20+ master students on petrophysical characterization and field geomechanics units as Teaching and Research assistant role at Curtin University. Also involved in project creation, weekly **communication, and supervision** of UG final year project
- Developed **value driven** multiscale approach on **geomechanical characterization** of unconventional energy resource in the Canning Basin from laboratory to field stimulation scale as part of collaborative PhD research program between Curtin University and CSIRO
- **Experience in** measurement of **rock mechanical and ultrasonic** properties under in-situ stress conditions with high pressure Autonomous Triaxial cell in collaboration with CSIRO's Geomechanics & Geophysics Team. Development of 1-D least principal stress model considering **viscoelastic stress rheology** by combining creep deformation, wireline logs and numerical method which is a **technical excellence** supported by direct field application to understand long term **stability** of underground rock formation
- Novel utilization of modern non-contact **laser ultrasonics** technology to improve estimation of elastic and anisotropy properties through **cross-collaborative engagement** between Curtin University, CSIRO, and The University of Auckland, New Zealand
- Built 3-D structural framework supported grid-based **geomechanical** models using **JewelSuite** Geomechanics and subsurface modelling software package in the Ichthys gas field to understand rock failure characteristics, rock strength and frictional properties distribution, overburden stress variation to manage **hazard**, shear slip and production monitoring
- **Organizing, communicating, and collaborating** with 300+ members as Secretary of ASEG WA branch and previously as Founder and President of EAGE-SEG club at Curtin University for effective implementation of chapter's activity like technical talk, event organization, Webinar, sponsorship, social networking, and mentoring program
- Designed technology upgradation through Artificial intelligence driven **machine learning** workflow with **Python** programming to address data gaps and reliable property estimation from existing database like filling of **petrophysical logs, sonic log estimation, outlier identification,** and **TOC prediction**
- **Hands on experience in high level software suits** including Jewel Suite, Petrel, IP, CSMP, FSP, Abacus, Insite, etc.
- Practical geometry design software skill acquired through finite element numerical simulation of 3D static mechanical earth model and hydraulic fracturing design using **CAD technical platform of Abacus and Rhino**
- **Proficient in** high level product delivery and quality control **with a strong attention to continuous improvement initiative and planning led to** multiple direct project awards to PGS and student awards through working experience in research and professional roles
- Adopted safety first policy in the workplace through participation as a team member of PGS fire warden
- Strong ability to work with **multi-culturally diverse** groups and team building via collaborative research program, volunteering, mentoring and university student discipline appeals board representative

Work Experience

PhD/ Sessional Academic and Research Assistant *03/2018 – Current*

Curtin University | Perth, Australia

Responsibilities:

Final year PhD candidate where the project objective is to develop multiscale geotechnical workflow of rock mechanical elastic characterization starting from lab experiment to upscaling in boreholes dataset to field stimulation design program by including deformation, ultrasonic and petrophysical data, existing database, and finite element simulation of unconventional shale rock in the Canning Basin. Guide and assist UG and PG students on formation evaluation and geomechanics tutorial.

Achievements:

- Viscoelastic rheology model to understand long-term geomechanical impact on least principal stress variation
- Non-contact laser ultrasonic to improve elastic and anisotropic properties of rocks
- Acceptance of several technical papers on conference and peer-reviewed journal
- Advancement of practical geomechanical workflow for UG students supported by home-work assignment and solutions
- Multiple student awards from AIG, ASEG, AAPG and PESA for exemplary research work
- Created personal webpage for effective communication with wider audience

Summer Internship *11/2019 – 02/2020*

Qeye | Perth, Australia

Have generated software manual of web based QeyeCloud platform which directly benefits the company to reaching out to their customers about the product. Also built a quality control tool for optimum input data preparation to deploy seismic inversion.

Achievements:

- Software documentation of web based QeyeCloud
- Development of QC tool for optimum input data preparation of seismic inversion.

Project Geophysicist *05/2011 – 03/2018*

PGS/DUG | Perth, Australia; Mumbai, India

Responsibilities:

Started my career as Junior Geophysicist and achieve several promotions to the project Geophysicist position. Over five years duration, delivered several successful subsurface velocity modelling and imagining projects under minimal supervision. Liaise with various stakeholders within organization to test, validate and support different internal geophysical application tools and software.

Achievements:

- **Product champion** work of key technology to be production ready at PGS (**Q-VMB**)
- Improve customer feedback through continuous improvement process led to several large-scale direct project award
- Business up-sell (1 Million dollar) and future work opportunities generated for PGS as a project team

Publications (Peer- reviewed)

- Mandal, P.P., Sarout, J., and Rezaee, R. (2021). Mechanical properties of Goldwyer gas shale from deformation experiment at in-situ stress condition – Part I. **Submitted** for Rock Mechanics and Rock Engineering journal.

- Mandal, P.P., Sarout, J., and Rezaee, R. (2021). Creep behavior, frictional slip properties and viscoelastic stress relaxation rheology model of Goldwyer shale from deformation experiment at in-situ stress – Part II. **Under preparation** for Rock Mechanics and Rock Engineering journal.
- Mandal, P.P., Sarout, J., and Rezaee, R. (2021). Viscoelastic approach to capture varying least principal stress magnitude and the effect of observed stress layering on hydraulic fracturing-An example from shale formations of the Perth Basin. 55th US Rock Mechanics /Geomechanics Symposium, Houston, Texas – **Accepted.**
- Iqbal, M. A., Rezaee, R., Smith, G., and Mandal, P. P. Implications of thin laminations on pore structure of shale reservoir: Ordovician Goldwyer Formation Case study from Western Australia. The APPEA Journal.
- Haitham, A., Mandal, P.P., Sarmadivaleh, M., and Rezaee, R. (2021). Possible in-situ stress perturbation and weaker overburden rock formation impacting borehole stability in the Pluto gas field, NWS, Western Australia. Natural Resources Research. **Under Revision.**
- Mandal, P.P., Rezaee, R., and Sarout, J. (2020). Impact of the stress state and the natural network of fractures/faults on the efficiency of hydraulic fracturing operations in the Goldwyer shale formation. The APPEA Journal 60, no. 1 (2020): 163-83. https://doi.org/10.1071/AJ19025.
- Mandal, P.P., Sarout, J., and Rezaee, R. (2020). Geomechanical appraisal and prospectivity analysis of the Goldwyer shale accounting for stress and formation anisotropy. International Journal of Rock Mechanics and Mining Sciences 135: 104513. https://doi.org/10.1016/j.ijrmms.2020.104513.
- Chatterjee, R., Gupta, S.D. and Mandal, P.P. (2017). Fracture and stress orientation from borehole image logs: A case study from Cambay basin, India. J Geol Soc India 89, 573–580. https://doi.org/10.1007/s12594-017-0646-3.

Conference Proceedings and Presentations

- Mandal, P.P., Sarout, J., and Rezaee, R. (2021). Viscoelastic stress relaxation rheology model in estimating continuous least principal stress magnitudes at depth in sedimentary rocks. 2nd International Slope stability in Mining (SSIM) conference, Perth, WA – **Accepted.**
- Mandal, P.P., Salimzadeh, S., Sarout, J., and Rezaee, R. (2021). Optimizing Hydraulic Fracturing Simulation Under Varying Least Principal Stress at Depth: Goldwyer Shale Formation, Canning Basin, Western Australia, URTeC 2021, Houstan, Texas, USA. **Awaiting response.**
- Iqbal, M. A., Mandal, P. P., Rezaee, R., Sarout, J., and Smith, G., (2021). Integration of mechanical stratigraphy with lithofacies in Goldwyer shale for selecting producible and hydraulic fracturing layers. 82nd EAGE Annual Conference and Exhibition, Amsterdam, Netherlands. – **Awaiting response.**
- Mandal, P.P., Essa, I., and Rezaee, R. (2021). Multi-purpose utility of constructing 3D static mechanical earth model in the Ichthys field, Browse Basin. AEGC Technical Program Expanded Abstracts, Brisbane, Australia.
- Mandal, P.P., Rezaee, R., Sari, M. and Sarout, J., (2021). Compositional control on frictional properties of Goldwyer shale. AEGC Technical Program Expanded Abstracts, Brisbane, Australia.

- Mandal, P.P., Rezaee, R., Sarout, J. and Sari, M. (2021). Varying least principal stress along lithofacies in gas shale reservoirs: Impact of frictional strength and viscoelastic stress relaxation. The APPEA Journal, no. 1: 1-6. https://doi.org/10.1071/AJ20064.
- Mandal, P.P., Rezaee, R., and Sarout, J. (2020). Impact of stress regime on shale's brittleness: Implications for determining suitable hydraulic fracturing intervals. Conference Proceedings, EAGE 2020 Annual Conference & Exhibition Online, Dec 2020, Volume 2020, p.1 – 5. https://doi.org/10.3997/2214-4609.202010489.
- Mandal, P.P and Rezaee, R. (2019). Facies classification with different machine learning algorithm – An efficient artificial intelligence technique for improved classification. AEGC Technical Program Expanded Abstracts. Paper no 22. Perth, 2019.
- Mandal, P.P. and Sahoo, D. (2018). Full waveform inversion (FWI): A high fidelity complex earth model building platform, Poster presentation on emerging trends in geophysical research for make-in-India (ETGRMI), IIT (ISM) Dhanbad, India.
- Mandal, P.P., Koh, W., Bluteau, J., Laws, D. and Greenhalgh, J. (2016). Combining high resolution modelling and one-way wave field extrapolation migration to image beneath a complex overburden: A case study from Porcupine Basin, Ireland, Petroleum Exploration Society of Australia (PESA), 143, 36-42.

Volunteering

Secretary *2020 - Current*
ASEG, WA

- Coordinate monthly event and keep communication with esteemed members.
- Prepare meeting minutes and distribution among committee.
- Track of membership renewal and opportunity for sponsorship.
- Organize Webinar from speakers across the world.

Member *2019- Current*
Toastmaster International, Curtin Club

- Learn public speaking, impromptu speech, and event management.
- Run meeting as toastmaster, delivered project speech among members for improvement.

President and Founder *2018 - 2019*
EAGE-SEG student Chapter, Curtin University

- Established student chapter with support from all students and faculty.
- Successfully established the chapter and lead from front to keep it running.
- Liaise between EAGE and SEG student officer and the chapter.

Awards/Achievements/Activities

- 2021: **ASEG** WA student award
- 2020-2021: **AIG** student bursary award.
- 2020: **AAPG** Grant-in-Aid recipient.
- 2019-2021: Recipient of **HDR RTP Scholarship.**

- 2020: Certificate of appreciation from EAGE Curtin University club to establish the chapter.
- 2021-2018: Recipient of **PESA Federal Postgraduate scholarship** award.
- 2019: Received student support from **EAGE student fund.**
- 2019: Certificate of Appreciation from **EAGE for volunteering technical** event.
- 2019: Certificate of Accomplishment Stanford University's online course "**Unconventional Reservoir Geomechanics**".
- 2018: Certificate of Accomplishment Stanford University's online course "**Reservoir Geomechanics**".
- 2018-2019: Certificate of Completion "**Machine Learning**" online course by Stanford University.
- 2018: Certificate of Completion "Programming for Everybody (Getting started with **Python**)" online course by **University of Michigan.**
- 2018 - Current: Committee member and Secretary of **ASEG WA** branch.
- 2019 - Current: Active member of EAGE, PESA, SEG and club member of Toastmasters international club.
- 2019: **President** of EAGE Curtin Student Chapter.
- 2016 - 2018: Member of cultural management team of Bengali association of WA.
- 2011-2008: Recipient of **Merit-cum-Means Scholarship** conferred by ISM, Dhanbad, India
- 2010: Controller of SEG Student Interaction Program at ISM, Dhanbad.
- 2008-2005: Received an award under **National Merit Scholarship** scheme of Govt. of India.

Referees

Prof. Reza Rezaee
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