RENU V

Assistant Professor

Department of Civil Engineering

Indian Institute of Technology (Indian School of Mines) Dhanbad

Contact Details

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Google scholar profile:

https://scholar.google.com/citations?user=GzRbaJQAAAAJ&hl=en

Researchgate profile: https://www.researchgate.net/profile/Renu_Valsala

Research Interest

- Groundwater Flow and Contaminant Transport
- Subsurface Fluid Dynamics
- Onshore oil spill modeling
- Mine water Planning and Management
- Hydrogeology of fractured Rocks
- Groundwater management & Subsurface Remediation

Educational Qualification

Degree/ Qualifying Exam	Institute/University	Duration	CGPA/Percentage
Doctor of Philosophy (Ph.D.) **Thesis Title: Numerical modeling on transport of petroleum hydrocarbons in saturated subsurface systems.** **Guide: Prof. G. Suresh Kumar**	**Indian Institute of Technology Madras** (Department of Ocean Engineering, Petroleum Engineering Program)	Jul 2013 – Jan 2019	9.6/10
Master of Technology (M.Tech.) **Specialization: Hydraulics and Water Resources Engineering** **Thesis Title: Numerical modeling of solute transport through fractures with fracture-skin.**	**Indian Institute of Technology Madras,** (Department of Civil Engineering)	Aug 2007 - Jul 2009	9/10
Bachelor of Technology (B. Tech.) **Specialization: Civil Engineering**	**College of Engineering Trivandrum, University of Kerala**	Aug 2003 – May 2007	8.11/10
Higher Secondary Examination	**Cottonhill government model girls' higher secondary school**, Thiruvananthapuram, Kerala	Aug 2001-May 2003	89%
Secondary School Leaving Certificate	**Pattom government model girls' higher secondary school,** Thiruvananthapuram, Kerala	Jun 2000 - May 2001	93 %

Research and Teaching Experience

<table>
<tr><th>Position</th><th>Duration</th><th>Responsibility</th></tr>
<tr><td>Assistant Professor, Department of Civil Engineering, IIT (ISM) Dhanbad</td><td>25/09/2019 – tilldate</td><td>
<table>
<tr><th>Subject</th><th>Subject Type</th><th>Semester</th></tr>
<tr><td>Numerical Methods in Civil Engineering</td><td>PG- Dept. Core</td><td>Monsoon 23-24, Monsoon 24-25</td></tr>
<tr><td>Environmental Engineering-II</td><td>UG- Dept. Elective</td><td>Winter 22-23, Winter 23-24, Winter 24-25</td></tr>
<tr><td rowspan="2">Hydrogeology and Well Hydraulics</td><td rowspan="2">PG- Dept. Elective</td><td>Winter 22-23</td></tr>
<tr><td>Winter 21-22</td></tr>
<tr><td>Flow and Transport Through Porous Media</td><td>UG- Open Elective</td><td>Monsoon 22-23, Monsoon 23-24, Monsoon 24-25</td></tr>
<tr><td>Environmental Engineering-1</td><td>UG- Dept. Core</td><td>Monsoon 21-22
Monsoon 20-21</td></tr>
<tr><td>Environmental Engineering Laboratory (sharing)</td><td>UG- Dept. Core</td><td>Monsoon 20-21</td></tr>
<tr><td>Hydrology and Hydraulic Structures (sharing)</td><td>UG- Dept. Elective</td><td>Winter 20-21</td></tr>
<tr><td>EngineeringGraphics</td><td>UG- Institute Core</td><td>Winter 21-22,
Monsoon 21-22,
Winter 20-21,
Monsoon 20-21,
Monsoon 19-20,
Winter 19-20</td></tr>
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</td></tr>
<tr><td>Visiting Assistant Professor Department of Civil Engineering, IIT (ISM) Dhanbad</td><td>25/06/2019-24/09/2019</td><td></td></tr>
<tr><td>Research and Teaching Assistant Department of Ocean Engineering, IIT Madras</td><td>Jul 2013 – Jan2019</td><td>• Research assistantship in projects related to Onshore oil spill
• Teaching assistantship in the following post graduate courses: Reservoir Engineering, Reservoir Simulation,Applied Hydrodynamics in Ocean and Petroleum Engineering, Enhanced Oil Recovery</td></tr>
<tr><td>Teaching Assistant Department of Civil Engineering, IIT Madras</td><td>Aug 2007 – Jan2009</td><td>Teaching assistanship in following post graduate courses: Applied Hydraulic Engineering, Hydraulic Engineering Laboratory, Groundwater Engineering, Contaminant Transport Modeling</td></tr>
<tr><td>Summer Training, National Centre for Earth Science Studies (CESS, Trivandrum)</td><td>May 2008 - July 2008</td><td>Worked in project titled GIS based design of rain harvesting systems in Kerala</td></tr>
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Industry Experience

Position	Duration	Responsibility
Product Engineer, Desalination Product Group, Boiler Auxiliaries Plant, Bharat Heavy Electricals Limited (BHEL)	Aug 2010– July 2013	• Worked as an engineer in the Desalination Product Group of Engineering Department. • Underwent on job training for an initial period of one year. The training included visit to various power plants in the country, lectures on the planning and execution of projects, management and leadership classes and interaction sessions with customers of

Engineer Trainee, Desalination Product Group, Boiler Auxiliaries Plant, Bharat Heavy Electricals Limited (BHEL)	Jan 2009 – Aug 2010	BHEL. • Worked as contract engineer for a period of one and half year. Responsibilities included the design of alignment of water treatment plant, water tanks and pipe distribution systems. • Worked in the proposal group for two years. Involved in the tender preparations for the proposed water treatment plants.

Administrative Responsibilities

- Faculty in charge Placement & Internship, Department of Civil Engineering, (Nov 2023 – till date)
- Member of Department Postgraduate Committee
- CDC Vice chairperson UG internships (December 2023-June 2024)
- Chief warden, Ruby & Rosaline hostel, IIT(ISM) Dhanbad (July 2022- June 2023)
- Warden, Ruby & Rosaline hostel, IIT(ISM) Dhanbad (July 2020- June 2022)
- Co-coordinator, Water Science and Technology Division, Centre for Water Resources Management, IIT(ISM) Dhanbad (July 2022 – till date)
- Department coordinator for NABL accreditation, Department of Civil Engineering, IIT(ISM) Dhanbad.
- Faculty in charge, Fluid Mechanics Laboratory, Department of Civil Engineering, IIT (ISM) Dhanbad
- Member of Department Undergraduate Committee, Department of Civil Engineering, IIT(ISM) Dhanbad.
- Member of Department Advisory Committee, Department of Civil Engineering, IIT(ISM) Dhanbad, IIT(ISM) Dhanbad.
- Treasurer, Faculty in Charge, Civil Engineering Association

Research Publications

Publications in International Journals

- Akanksha Srivastava, Renu Valsala, Sheeja Jagadevan. Biogeochemical modelling to assess the effect of bioclogging on multiple electron acceptor-mediated petroleum hydrocarbon bioremediation in vadose zone. Environmental Science and Pollution Research, **Year** 2024. DOI:https://doi.org/10.1007/s11356-024-33232-x

- Gautam Roy, Renu Valsala**. Numerical model to assess the effect of hydrogeological characteristics of mine waste piles on capping efficiency in unsaturated conditions.** Multiscale and Multidisciplinary Modeling, Experiments and Design, Year 2024. DOI:10.1007/s41939-024-00488-2

- Gautam Roy, Renu Valsala. Impact of capping on pyrite oxidation ion transport in unsaturated mine waste pile: A hydrogeochemical modeling study. Modeling Earth Systems and Environment, **Year** 2024. DOI:https://doi.org/10.1007/s40808-024-01991-8

- Gautam Roy, Renu Valsala. Hydrogeochemical modelling of pyrite oxidation ion mobility in unsaturated mine waste rock piles. Environmental Earth Sciences, **Volume** 83, **Year** 2024, **Pages** 127. DOI:https://doi.org/10.1007/s12665-023-11414-z

- Akanksha Srivastava, **Renu V,** Sheeja Jagdevan. Biogeochemical modelling to assess benzene removal by biostimulation in aquifers containing natural reductants. Environ Sci Pollut Res (2023). https://doi.org/10.1007/s11356-023-25557-w

- Akanksha Srivastava., **Renu V**. Numerical modeling to assess the effect of soil texture on transport and attenuation of petroleum hydrocarbons in unsaturated zone. Environ Sci Pollut Res (2023). https://doi.org/10.1007/s11356-023-25557-w

- **Renu V**, Suresh Kumar G. Numerical modeling on co-colloidal transport of BTEX in fractured rock. Environmental Earth Sciences. **81**, 37 (2022). https://doi.org/10.1007/s12665-021-10161-3

- Wagh P, Sojan J M, Babu S J, **Renu V**, Bhatia S, Srivastav R. Indicative Lake Water Quality Assessment Using Remote Sensing Images-Effect of COVID-19 Lockdown. Water 2021; 13:73.

- **Renu V**, Suresh Kumar G. Co-colloidal BTEX and Microbial transport in a Saturated Porous System: Numerical Modeling and Sensitivity Analysis. Transport in Porous Media. 2019; 127 (2): 269-294. DOI: 10.1007/s11242-018-1191-2.

- **Renu V**, Suresh Kumar G. Mathematical modeling on mobility and spreading of BTEX in a discretely fractured aquifer system under the coupled effect of dissolution, sorption, and biodegradation. Transport in Porous Media. 2018; 123 (2): 421-452. DOI: 10.1007/s11242-018- 1049-7.

- **Renu V**, Suresh Kumar G. Multispecies transport modeling on biodegradation of Benzene, Toluene and Xylene in a saturated fracture-matrix system with multiple electron acceptors. Environmental Engineering Science. 2018; DOI:10.1089/ees.2017.316.

- **Renu V**, Suresh Kumar G. Interaction of dissolution, sorption and biodegradation on transport ofBTEX in a saturated groundwater system: numerical modeling and spatial moment analysis. Journal of Earth System Science. 2018; 127:53.

- **Renu V**, Suresh Kumar G. Multi-component transport of BTX in a discretely fractured aquifer with fracture-skin: numerical investigation and sensitivity analysis. Environmental Earth Sciences. 2017; 76(17): 1-15. DOI:10.1007/s12665-017-6956-3.

- **Renu V**, Suresh Kumar G. Benzene Dissolution and Transport in a Saturated Sinusoidal Fracture with non-uniform Flow: Numerical Investigation and Sensitivity Analysis. Environmental Processes. 2017; 4(3):587-601. DOI: 10.1007/s40710-017-0252-9.

- **Renu V**, Suresh Kumar G. Numerical modeling on benzene dissolution into groundwater and transport of dissolved benzene in a saturated fracture-matrix system. Environmental Processes. 2016; 3(4):781-802. DOI: 10.1007/s40710-016-0166-y.

- **Renu V**, Suresh Kumar G. Temporal moment analysis of multi-species radionuclide transport in a coupled fracture-skin-matrix system with a variable fracture aperture. Environmental Modeling & Assessment. 2016; 21(4): 547-562. DOI: 10.1007/s10666- 016-9515-5.

- **Renu V**, Suresh Kumar G. Temporal Moment Analysis of Solute Transport in a Coupled Fracture-Skin-Matrix System. Sadhana - Academy proceedings in Engineering Sciences. 2014; 39(2): 487-509.

- **Renu V**, Suresh Kumar G. Numerical modeling and spatial moment analysis of solute mobility and spreading in a coupled fracture-skin-matrix system. Geotechnical and Geological Engineering. 2012; 30(6): 1289-1302. DOI: 10.1007/s10706-012-9540-3.

International Conferencess

- Akanksha Srivastava**,** Renu Valsala. and Sheeja Jagadevan, 2024, June. Nitrate Mediated Biostimulation of Petroleum-based NAPLs in Subsurface Environment with Dynamic pH Scenarios: A Hydrogeochemical Modelling Approach. **21st Annual Meeting** of the **Asia Oceania Geosciences Society** held at Pyeongchang-gun, Gangwon-do during the period 23 Jun to 28 Jun 2024

- Akanksha Srivastava, Renu Valsala, Sheeja Jagadevan. **Hydrogeobiochemical Modelling for Bioremediation of Mono-Aromatic Hydrocarbons Using Nitrate-Sulfate-Reducing Assemblages in Aquifers. EGU General Assembly 2024. Vienna, Austria**, 14–19 Apr 2024, EGU24-4243, https://doi.org/10.5194/egusphere-egu24-4243, 2024.

- Akanksha Srivastava, Renu Valsala, Sheeja Jagadevan. Biogeochemical Modelling for Monitoring the Impact of Microbial Clogging on Benzene Bioremediation in Unsaturated Aquifers. In AGU Fall Meeting Abstracts (Vol. 2023, pp. H11B-07). **AGU Fall Meeting 2023**, held in San Francisco, CA, 11-15 December 2023

- Akanksha Srivastava. and Valsala, R., 2022. "Numerical Modelling of Benzene Biodegradation in Aquifers Under the Presence of Multiple Electron Acceptors". Indian Geotechnical Conference (IGC) 2022. 15 th – 17 th December, 2022, Kochi Chapter.

- Renu V, Suresh Kumar G. Sensitivity analysis of higher order spatial moments for a coupled fracture-skin-matrix system. Third International Perspective on Current and Future State of Water Resources and the Environment. Jan 5-7, 2010, held at IIT-Madras.

- Renu V, Suresh Kumar G. Numerical Modeling on Two-Phase Fluid Flow in a Coupled Fracture-Skin-Matrix System. AGU Fall Meeting held at San Fransisco between 14th and 18th Dec 2015. Abstract ID: 69054, Paper Number: H54F-05.

- Renu V, Suresh Kumar G. Numerical Modeling on Fate and Migration of BTEX dissolving froma Residual Source Zone within a Saturated Groundwater System. 7th International Groundwater Conference (IGWC-2017) on Groundwater Vision 2030 – "Water Security, Challenges & Climate Change Adaption" (Theme: 6 & Technical Session: 10) held at New Delhi-India during 11-13 Dec2017.

- Renu V, Suresh Kumar G. Modeling Investigations on Sorption of Petroleum Hydrocarbons to Clay Minerals in a Saturated Porous Aquifer. Proceedings of the Fourth International Conference in Ocean Engineering (ICOE2018) Part of the Lecture Notes in Civil Engineering book series (LNCE, volume 22), 2019.

Research Projects

- Hydrogeochemical Modeling to Investigate Acid Mine Drainage in Fractured Aquifer System sanctioned 9.5 lakhs under Faculty Research Scheme IIT (ISM) Dhanbad. Status – completed.
- Scientific study on stability of proposed diversion of Bokkalavagu nallah over goaved out Longwall Panels of GDK-10 Incline on the surface and assessment of Impact of blasting in RG OCP-I on embankment of proposed divertion nallah and assessment of water danger to Adriyala Longwall Project, RG OCP-I Expansion. Sanctioned amount: Rs. 9,73,500/-. Funded by: The Singareni Collieries Company Limited. Role: Co-PI, Status - completed

- Identification of suitable sites and designing of environmentally friendly rainwater harvesting structures for catching the rain where it falls when it falls in the IIT(ISM) campus area. Funded by: IIT (ISM) Dhanbad. Sanctioned amount: Rs. 8,80,000/- Funded by IIT (ISM) Dhanbad. Role: Co-PI, Status- Completed

- To conduct an independent study on assessment & validation of mine-wise water to ensure optimum and gainful utilization of mine water. Funded by Western Coalfields Limited. Sanctioned Amount - Rs. 47.77 Lakhs, Role-Co-CI, Status- Completed.

- A comprehensive run-off management study inside the mining lease areas of Bolani Ores Mines. Funded by Steel Authority of India. Sanctioned Amount - Rs. 29.5 Lakhs, Role-Co-CI, Status- Under Progress.

- Study to verify mine-water availability and potential of mine water for community use in BCCL. Funded by BCCL, Role: Co-CI, 79.94 lakhs, Status-Ongoing

- A Novel Modeling Approach for Selecting Suitable Intrinsic Bioremediation Strategies for Attenuating Oil Spills in Coastal Aquifers. Funded by DST(ANRF) Sanctioned Amount – Rs 28.86 Lakhs, Role-PI, Status-Ongoing

Thesis Guidance

Ph.D.

- Ms. Akanksha Srivastava, Pursuing Ph.D. since August 2020, Title: Numerical Modeling of Biogeochemical Interactions Influencing Bioremediation of BTEX in Unsaturated Zones. (Co-supervisor: Prof. Sheeja Jagadevan) Status- Thesis submitted

- Mr. Arindam Roy, Pursuing Ph.D. since August 2022- Title: An integrated Numerical and Machine Learning modelling on bioremediation of hydrocarbons in aquifers Collaborative PhD program with IIT(ISM) (IIT (ISM) Dhanbad Co-Supervisor: Prof. Kironmala Chanda) Dhanbad and Curtin University

- Ms. Ankita, Pursuing Ph.D. since August 2023- Title: Assessing the Impact of Heterogeneity on Pyrite Ion Transport in Fractured Mine Overburden Dumps: Hydrogeochemical Modeling Study

- Mr. Mithu Prasad, Pursuing PhD since August 2023 (Co-supervisor: Prof. Archana)- Title: Numerical model development for assessing Residual CO_2 trapping in saline aquifers with fractured caprock

- Mr. Rahul Kumar, Pursuing since December 2023- Title: Numerical Modelling of multiphase flow in porous Media: Methods and applications

Completed: Dr. Gautam Roy, Title- Hydrogeochemical modelling for assessing the mobility of pyrite oxidation ions in unsaturated mine overburden dumps, Year of completion – 2024.

M.Tech.

- Mr. D Sai Kalyan: Title: GIS Integrated Groundwater Modelling to Assess the Effect of Various Extraction and Recharge Patterns on Water table Fluctuations. Status- In progress

- Mr. Rahul Kumar: Title: A sandbox approach to hydraulic gradient and hydraulic conductivity for porous sand using Darcy law, Status: In Progress

- Ms. Rashmita: Title: Ground water potential and mapping. Status: In Progress

Completed

- Mr. Janmay Jai Gautam, Thesis title- Numerical modeling to investigate the transport characteristics of chlorinated solvents from a residual landfill source to groundwater, Status- Completed in May 2023

Awards and Achievements

- Reviewer for reputed international journals like the Journal of Hazardous Materials, Scientific reports Hydrogeology Journal, Environmental Earth Sciences etc.
- MHRD Scholarship (July 2013-July 2018) for pursuing Ph.D. at Indian IITMadras
- MHRD Scholarship (August 2007-July 2009) for pursuing M.Tech at Indian IITMadras
- Secured 253rd rank in All India Graduate Aptitude Test Examination (GATE) in2007.
- Stood in top 1% in class in M.Tech program at IIT Madras.
- Stood in top 10 % in class in B.Tech program.

Computing Skills

Programming Languages:
C/C++ Computing Languages:
MATLAB,
Technical Packages: EPANET, AutoCAD 2011
Others: ORIGIN 7.0

Personal Details

Date of Birth	:21 October 1985
Languages Known	:Malayalam (mother tounge), English, Hindi
Present Address	:Old D-33, Teachers Colony, IIT (ISM) Dhanbad, Dhanbad, India, Pin:826004
Permanent Address	:Saras, Thekkummoodu, Vanchiyoor P.O, Thiruvananthapuram, Pin: 695035Kerala