# Rajapakse Mudiyanselage Chathura Madushanka Rajapakse

Senior Lecturer (Grade II), Department of Civil Engineering, University of Moratuwa
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## Education

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| 2018-2023 Feb. | **Doctor of Philosophy in Engineering Sciences and Technology** (awarded by ULiège)<br>**Doctor of Philosophy in Engineering Technology** (awarded by UHasselt)<br>PhD researcher at University of Liège and Hasselt University, Belgium<br>Title of thesis – Behaviour and modelling of reinforced concrete dapped-end connections |
| 2015-2018 | **Master of Philosophy in Engineering (MPhil)**<br>Faculty of Engineering, University of Peradeniya, Sri Lanka<br>Title of thesis – Finite element formulation of a line element accounting for the axial-moment-shear interaction of reinforced concrete beams and columns |
| 2011-2015 | **Bachelor of Science in Engineering – Specialized in Civil Engineering (BSc Eng)**<br>Faculty of Engineering, University of Peradeniya, Sri Lanka<br>GPA: 3.35/4.00 (Second class upper division)<br>Final year GPA: 4.0/4.0 |
| 2008-2010 | **G.C.E. Advanced Level Examination 2010**<br>Dharmaraja College, Kandy, Sri Lanka<br>Result: 3A's *(For all subjects: Combined Maths, Physics and Chemistry)*<br>Winner of merit scholarship for outstanding performance at G.C.E. A/L 2010<br>Z score: 2.4017 |

## Employment History

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| 2024 Feb. - Present | **Senior Lecturer (Grade II)**<br>**Department of Civil Engineering, University of Moratuwa**<br>Teaching: Mechanics of Materials, Introduction to Conceptual Design, Computational Mechanics, Comprehensive Design Project, Design of Concrete Structures I (understudy), Design of Large Structures (understudy), Building Engineering (understudy), Sustainable Design and Construction (understudy)<br>Research supervision: Supervision of five undergraduate research projects (2024) |
| 2018 – 2023 | **Doctoral Researcher**<br>**University of Liège and Hasselt University, Belgium**<br>Teaching: Prestressed Concrete Structures (Teaching Assistant)<br>Research supervision: Co-Supervised two MSc research projects |
| 2015 – 2018 | **Research Asisstant**<br>**University of Peradeniya, Sri Lanka**<br>Teaching: Computer Aided Design (Teaching Assistant), Finite Element Analysis (Teaching Assistant) |

## Research Interests

- Developing kinematics-based models for disturbed regions in concrete structures
- Crack-based assessment and monitoring of existing concrete structures
- Laboratory testing of large-scale structural elements with classical instrumentation and Digital Image Correlation (DIC)
- Fibre reinforced concrete and Ultra High-Performance Fibre Reinforced Concrete (UHPFRC)
- Retrofitting solutions using external Carbon Fibre Reinforced Polymer (CFRP) wraps, UHPFRC jacketing
- Modelling of corrosion and bond deterioration in concrete structures
- Formulation of force-based line elements for nonlinear finite element analysis

## Research Experience

- **University of Liège and Hasselt University, Belgium**
  Doctoral Researcher (2018-2023)

  - Developed kinematics-based models for strength prediction of reinforced concrete and fibre reinforced concrete dapped-end connections
  - Developed kinematics-based models for crack width prediction and complete pre-peak, peak and post-peak response of reinforced concrete and fibre reinforced concrete dapped-end connections
  - Developed kinematics-based models for deep beams and dapped-end connections strengthened with external CFRP wraps
  - Developed kinematics-based models for strength prediction of fibre reinforced concrete deep beams
  - Conducted research on developing a framework for crack-based assessment of dapped-end connections in existing structures
  - Designed and conducted an extensive experimental campaign of testing 16 large-scale reinforced concrete dapped-end connections (depth of dapped-end 0.5m, full-depth 1m, total length 5.3 m)
  - Participated in laboratory testing of a variety of large-scale structural elements including UHPFRC strengthened shear walls and deep beams, reinforced concrete shear walls with voids, high cycle fatigue testing of reinforced concrete deep beams

- **University of Peradeniya, Sri Lanka**
  Research assistant of National Research Council of Sri Lanka (2015-2018)

  - Developed a force-based line element for nonlinear finite element analysis of reinforced concrete beams and columns
  - Developed a force-based line element with axial force-bending moment-shear force interaction for nonlinear static analysis of reinforced concrete frames
  - Assisted Prof. Kushan Wijesundara in conducting detailed 3-dimensional finite element analysis for assessment of a number of existing structures

## Professional Affiliations

- Young Engineer Member, International Association for Bridge and Structural Engineering (IABSE), Switzerland
- Student member, International Federation for Structural Concrete (*fib*), Switzerland (2019-2020)
- Member, International Association for Bridge Maintenance and Safety (IABMAS), Sri Lankan Group
- Green Associate Professional, Green Building Council of Sri Lanka (GBSL July/August 2016 batch)

## Projects

- **Monitoring of reinforced concrete and prestressed concrete dapped-end connections of bridges in Wallonia, Belgium (2020-present)**
  - Collaborators: Service Public de Wallonie, Belgium. Prof. Boyan Mihaylov is leading the researchers from University of Liège in this project
  - Tasks performed: Analysis of 10 selected dapped-end connections of bridges in the province of Wallonia, Belgium using the kinematics-based models developed as part of my doctoral studies

- **Instrumentation of Ortheuville concrete arch bridge in Wallonia, Belgium (2019)**
  - Collaborators: Service Public de Wallonie, Belgium. Prof. Boyan Mihaylov led the researchers from University of Liège in this project
  - Tasks performed: Process and analyse data from displacement transducers, inclinometers, temperature sensors

- **Monitoring of a steel pier in Rajagiriya flyover (2018)**
  - Collaborators: This assignment was conducted by the Senior Lecturers of the Department of Civil Engineering, University of Peradeniya, Dr. U. I. Dissanayake, Prof. K. K. Wijesundara, Dr. Dammika Abeykoon and Dr. H. A. D. Samith Buddika, in collaboration with Engineering Design Centre (EDC), Faculty of Engineering, University of Peradeniya.
  - Tasks performed: Assisted the team from University of Peradeniya in carrying out acceleration measurements at critical locations on the bridge deck under normal, peak and controlled traffic conditions

- **Assessing and evaluating the existing condition of the Gadaladeniya Rajamaha Viharaya with the use of a detailed 3-dimensional Finite Element model (2018)**
  - Collaborators: This assignment was undertaken by Dr. Udaya Dissanayake, Prof. Kushan Wijesundara, Eng. Chathura Rajapakse and Eng. Jayasinghe of University of Peradeniya
  - Tasks performed: Assisted in developing a detailed 3-dimensional Finite Element (FE) model for the assessment of the Viharaya under existing load condition and with additional roof loading

## Publications

- **International Journal Publications (Published)**

1. **Rajapakse, C.**, Degée, H. and Mihaylov, B., 2024. Experimental Investigation of Dapped Ends with Diagonal Reinforcement, ACI Structural Journal, 121(4).
   DOI: 10.14359/51740710

2. **Rajapakse, C.**, Degée, H. and Mihaylov, B., 2022. Investigation of shear and flexural failures of dapped-end connections with orthogonal reinforcement. Engineering Structures, 260, p.114233.
   https://doi.org/10.1016/j.engstruct.2022.114233

3. Fathalla, E., **Rajapakse, R.M.C.M**. and Mihaylov, B.I., 2022. Modeling the shear behavior of deep beams strengthened with FRP sheets. Engineering Structures, 260, p.114232.
   https://doi.org/10.1016/j.engstruct.2022.114232

4. Mihaylov, B., **Rajapakse, C.** and Berger, P.H., 2022. Effect of steel fibers on the ultimate flexural behavior of dapped-end connections. Engineering Structures, 259, p.114147.
   https://doi.org/10.1016/j.engstruct.2022.114147

5. Hippola, S., **Rajapakse, C.**, Mihaylov, B. and Wijesundara, K., 2021. A force-based fiber beam-column element to predict moment-axial-shear interaction of reinforced concrete frames. Structural Concrete, 22(4), pp.2466-2481. https://doi.org/10.1002/suco.202100262

6. **Rajapakse, C.**, Degée, H. and Mihaylov, B., 2021. Assessment of Failure along Re-Entrant Corner Cracks in Existing RC Dapped-End Connections. Structural Engineering International, 31(2), pp.216-226. https://doi.org/10.1080/10168664.2021.1878975

7. Mihaylov, B. and **Rajapakse, C.**, 2021. A simplified kinematic approach for the shear strength of fiber-reinforced concrete deep beams. Structural Concrete, 22(1), pp.273-284. https://doi.org/10.1002/suco.201900461

8. **Rajapakse, R.M.C.M.**, Wijesundara, K.K., Nascimbene, R., Bandara, C.S. and Dissanayake, R., 2019. Accounting axial-moment-shear interaction for force-based fiber modeling of RC frames. Engineering Structures, 184, pp.15-36. https://doi.org/10.1016/j.engstruct.2019.01.075

- **Thesis publications**

1. **Rajapakse, C.** 2023. Behaviour and modelling of reinforced concrete dapped-end connections. PhD Dissertation. University of Liège and Hasselt University, Belgium. https://hdl.handle.net/2268/297365

2. **Rajapakse, R.M.C.M.** 2018. Finite element formulation of a line element accounting for the axial-moment-shear interaction of reinforced concrete beams and columns. MPhil Dissertation. University of Peradeniya, Sri Lanka.

- **International Conference Proceedings (published)**

1. **Rajapakse, C.**, Degée, H. and Mihaylov, B., 2022. A kinematics-based model for complete behaviour of RC dapped-end connections governed by re-entrant corner cracks. IABSE Symposium Prague 2022. https://hdl.handle.net/2268/291620

2. Fathalla, E., **Rajapakse, C**. and Mihaylov, B.I., 2022. Kinematic Modelling of Shear Critical Deep Beams Strengthened with Externally Bonded FRP. Proceedings for the 6$^{th}$ *fib* International Congress Oslo, Norway.

3. Hippola, H.M.S.S., **Rajapakse, C.M.**, Wijesundara, K.K. and Dissanayake, P.B.R., 2019. Modification of force-based fibre beam-column element formulation to cater highly localized nonlinear behaviour. Proceedings of the 7th ECCOMAS Thematic Conference on Computational Methods in Structural Dynamics and Earthquake Engineering, Crete, Greece.

4. Hippola, H.M.S.S., **Rajapakse, C.M.**, Wijesundara, K.K. and Dissanayake, P.B.R., 2019. Modification of force based fiber beam column element to consider explicit section equilibrium. 10$^{th}$ International Conference on Structural Engineering and Construction Management, Kandy, Sri Lanka.

5. **Rajapakse R.M.C.M.**, Wijesunadara K.K, Dissanayake P.B.R., 2016. “Force based linear static analysis of 2-D curved tapered Timoshenko beam elements”, Proceedings, Sixth International Congress on Computational Mechanics and Simulation, IIT Bombay, pp 1252-1255, 27-30.

## Complimentary Skills

- Fluent command of Sinhala and English languages
- Experienced in conducting structural engineering lab tests of large-scale test specimens
- Experienced in programming using Matlab
- Experienced in the use of advanced structural analysis software such as MidasFEA, Response 2000, VecTor2, VecTor5
- Skilled chess player

## Awards and Achievements

- Received full scholarship BOF 2018: Doctoraatsfonds
- Winner of Merit Scholarship for outstanding performance at G.C.E. A/L 2010 with a Z score of 2.4017
- At the time of selection, youngest ever chess player to represent Sri Lanka National Chess Team (at the age of 14 years)
- Won SLUSA Full Colours for outstanding performance at Inter University chess championship in years 2012, 2013

## Extra-curricular Activities

- **International Level**

- Member of Sri Lanka National chess team at World Chess Olympiad, Turin Italy 2006 and World Chess Olympiad, Dresdan Germany 2008
- Represented Sri Lanka in 27th World Universiade, Kazan Russia 2013
- Captained Sri Lanka National Youth chess team at Youth Olympiad, Singapore 2007

- **National Level**

- Member of Sri Lanka National chess team in years 2005, 2006, 2007, 2008

## Personal Information

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| Name | : | Rajapakse Mudiyanselage Chathura Madushanka Rajapakse |
| Date of birth | : | 23 October 1991 |
| Gender | : | Male |
| Nationality | : | Sri Lankan |
| Address | : | 43D, Pragathi Mawatha, Uda-Eriyagama, Peradeniya |

## Non-Related References

Prof. Boyan Mihaylov
*MSc (Sofia, Bulgaria), PhD (Pavia, Italy)*
Associate Professor
Department of ArGEnCo
Faculty of Applied Science
University of Liège
Belgium
Email: boyan.mihaylov@uliege.be

Prof. Kushan Wijesundara
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