Prof Celeste Viljoen, PrEng

Phone: +27 21 808 4444

Email: cbarnardo@sun.ac.za

ACADEMIC QUALIFICATIONS

2006: PhD (Structural Engineering), University of Stellenbosch

2001: BEng (Civil Engineering), Cum Laude, University of Stellenbosch

EXPERIENCE

Associate Professor: University of Stellenbosch, 01/2017 – current

Senior Lecturer: University of Stellenbosch, 09/2009 – 12/2016

- Structural Engineering
- Reliability and Risk Assessment
- Standardisation of structural engineering design
- Design of concrete structures
- Continuum mechanics and finite element analysis
- See attachment for list of publications, postgraduate student supervision, academic modules lectured and courses presented to engineering industry

Director of the Institute for Structural Engineering: University of Stellenbosch, 2010 – current

Acting head of Structural Division: Dept. of Civil Eng., 01/2011 – 06/2011

Structural Design Engineer: Element Consulting Engineers, 2004, 2006 – 2009

- Reinforced- and pre-stressed concrete design
- Bridge design
- Tender documentation
- Finite Element Analysis
- See attachment for project details

NATIONAL AND INTERNATIONAL INVOLVEMENT IN STRUCTURAL STANDARDISATION

JCSS	International Joint Committee on Structural Safety, member since 2010
ISO	Member of South African Mirror Group for the revision of ISO 2394
	Member of ISO TC 98/SC 2/WG 11
SABS	Convener of SANS 10100-3 Working Group
	Member of SABS TC 98-02
	SABS TC 98 representative: Revision of ISO 13824

MEMBERSHIPS

ECSA	Engineering Council of South Africa	Pr.Eng Registered
SAICE	South African Institute of Civil Engineers	Member

PUBLICATIONS

Refereed Journals

Submitted:

1. Fischer, K., Viljoen, C., Kohler, J., Faber, M.H., 2017, *Optimal and acceptable reliabilities for structural design*, Structural Safety, (at editor).
2. Walls, R., Viljoen, C., De Clercq, H., 2017, *Analysis of structures in fire as simplified skeletal frames using a customised beam finite element*, Fire Technology Journal, (under review)
3. Botha, J., Retief, J.V., Viljoen, C., 2017, *Quantification of uncertainty and -bias for South African primary wind load components*, Journal of the South African Institution of Civil Engineering, (under review)
4. Botha, J., Retief, J.V., Viljoen, C., 2017, *Updated wind load model for application in the calibration of SANS 10160-3*, Journal of the South African Institution of Civil Engineering, (under review)

In press:

1. Lenner, R., De Wet, D.P.G., Viljoen, C., 2017, *Bridge loading and traffic characteristics in South Africa*, Journal of the South African Institution of Civil Engineering, 2017

Published:

2. Walls, R.S., Viljoen, C., De Clercq, H., Clifton, C., 2017, *Reliability analysis of the Slab Panel Method for the design of Composite Steel Floors in Severe Fires*, Journal of Structural Fire Engineering
3. Walls, R.S., Viljoen, C., 2016, *A comparison of technical and practical aspects of Eurocode 3-1-1 and SANS 10162-1 hot rolled steelwork design codes*, Journal of the South African Institution of Civil Engineering, 58-1:16-25
4. Cloete, G., Retief, J.V., Viljoen, C., 2016, *A Rational Quantitative Optimal approach to dam safety risk reduction*, Civil Engineering and Environmental Systems, 33-1:1-21
5. Reynolds, S., Barnardo-Viljoen, C., 2014, *Evaluating the prioritisation of South African dams for rehabilitation with special focus on risk to human lives*, Journal of the South African Institution of Civil Engineering, 56-3:14-24
6. Barnardo-Viljoen, C., Mensah, K.K., Retief, J.V., Wium, J.A., van Zijl, G.P.A.G, 2014, *Background to the Draft SA National Standard for the design of Water Retaining Structures*, Concrete/Beton, 138:10-19
7. Retief, J.V., Diamantidis, D., Barnardo-Viljoen, C., Van der Klashorst, E., 2014, *Extreme actions and climate change: Experience gained in South Africa and Germany*, Civil Engineering and Environmental Systems, 31:179-188
8. Maincon, P., Barnardo, C., 2013, *An inverse finite element method for the analysis of VIV data,* Marine Structures, 33:143-159
9. Hauser, C., Walz, B., Maincon, P., Barnardo, C., 2008, *Application of inverse FEM to earth pressure estimation*, Finite Elements in Analysis and Design, 44:705-714

Conference publications

Abstracts accepted:

1. West-Russel, M, Viljoen, C., *Reliability assessment of cold formed steel columns designed using the direct strength method,* IALCCE, Ghent, Belgium, 2018

Published:

1. Boshoff, W.P., Viljoen, C., *Reliability based approach for determining the characteristic strength and material factor for macro synthetic fibre reinforced concrete,* International Conference on Advances in Construction Materials and Systems (71st RILEM Week & ICACMS), 2017, Chennai, India
2. Van Nierop, S., Viljoen, C., Lenner, R., *Target reliability of concrete structures governed by serviceability limit state design*, International Probabilistic Workshop (IPW), Dresden, Germany, 2017
3. McLeod, C.M., Viljoen, C., Retief, J.V., *Determining model uncertainty associated with concrete crack models for members in flexure*, International Probabilistic Workshop (IPW), Dresden, Germany, 2017
4. McLeod, C.M., Viljoen, C., Retief, J.V., *Determining model uncertainty associated with concrete crack models for members in tension*, International Probabilistic Workshop (IPW), Dresden, Germany, 2017
5. Retief, J.V., Holicky, M., Viljoen, C., *International practice and standardisation of the basis of structural design*, The 12th International Conference on Structural Safety and Reliability (ICOSSAR), Vienna, 2017
6. Olalusi, O.B., Viljoen, C., *Towards effective general probabilistic model representation for shear resistance*, The 12th International Conference on Structural Safety and Reliability (ICOSSAR), Vienna, 2017
7. Botha, J, Retief, J.V., Viljoen, C., *Hierarchical Bayesian wind load models for reliability assessment and calibration of standards*, The 12th International Conference on Structural Safety and Reliability (ICOSSAR), Vienna, 2017
8. Sykora, M., Holicky, M., Rozsas, A., Viljoen, C., Retief, J.V., Diamantidis, D., *Risk Based Design of Infrastructures under Extreme Actions due to Environmental Change*, Symposium of the International Association for Life-Cycle Civil Engineering (IALCCE), Delft, 2016, p1366-1373
9. Lenner, R., Viljoen, C., *Traffic Loading in South Africa – Remedial action*, fib Symposium, Cape Town, 2016
10. Viljoen, C., Retief, J.V., Sykora, M., *Reliability Assessment of fib Model Code Shear Resistance for Reinforced Sections*, fib Symposium, Cape Town, 2016
11. Reynolds, S., Viljoen, C., *Evaluation of life safety criteria for South African dams*, Symposium of the International Committee on Large Dams (ICOLD), Johannesburg, 2016
12. Holicky, M., Retief, J.V., Viljoen, C., *Partial Factors for Wind Actions Considering Hidden Safety due to Time Invariant Components*, SEMC: The 6th International Conference on Structural Engineering, Mechanics and Computation, Cape Town, 2016
13. Botha, J., Retief, J.V., Viljoen, C., *Application of Monte Carlo simulation for the reliability treatment of variables with multiple sources of uncertainty*, SEMC: The 6th International Conference on Structural Engineering, Mechanics and Computation, Cape Town, 2016
14. Van der Klashorst, E., Viljoen, C., Retief, J.V., *Reliability based design for vibration control of light steel floor structures*, SEMC: The 6th International Conference on Structural Engineering, Mechanics and Computation, Cape Town, 2016
15. McLeod, C.H., Viljoen, C., Retief, J.V., *Quantification of model uncertainty of EN1992 crack width prediction model*, SEMC: The 6th International Conference on Structural Engineering, Mechanics and Computation, Cape Town, 2016
16. Viljoen, C., Reynolds, S., *Evaluation of decisions to rehabilitate South African dams in terms of the ANCOLD ALARP criterion and SWTP for human safety*, The 12th International Conference on Applications of Statistics and Probability in Civil Engineering (ICASP12), Vancouver, 2015

17. Viljoen, C., Reynolds, S., *Economic optimization considerations in South African dam rehabilitations,* The 12th International Conference on Applications of Statistics and Probability in Civil Engineering (ICASP12), Vancouver, 2015
18. Botha, J., Retief, J.V., Viljoen, C., *Variability of time independent wind load components*, The 12th International Conference on Applications of Statistics and Probability in Civil Engineering (ICASP12), Vancouver, 2015
19. Holicky, M., Retief, J.V., Diamantidis, D., Viljoen, C., *On Standardization of the Reliability Basis of Structural Design*, The 12th International Conference on Applications of Statistics and Probability in Civil Engineering (ICASP12), Vancouver, 2015
20. Retief, J.V., Diamantidis, D., Viljoen, C., Van der Klashorst, E., *Application of Risk Based Infrastructure Design Concepts to provision for climate change*, American Meteorological Society annual conference, Atlanta, 2014
21. Jacobs, H.E.., Viljoen, C., De Villiers, W., *A review of Stellenbosch University Civil Engineering Department's first flexible assessment cohort in 2012,* The 7th Annual Conference on the Scholarship of Teaching and Learning, Stellenbosch, 2014
22. Van Wyk, R., Viljoen, C., *Reliability of thin-walled single screwed connections in cold-formed steel against tilt-and-bearing failure,* IPW12: The 12th International Probabilistic Workshop, Weimar, 2014
23. Walls, R., Viljoen, C., De Clercq, H., Retief, JV., *A Critical Review on Current and Proposed Structural Fire Engineering Codes for Steelwork in South Africa*, ICCMATS, Johannesburg, 2014,
24. Botha, J., Retief, J.V., Holicky, M., Viljoen, C., *Development of probabilistic wind load model for South Africa*, 13th Conference of the Italian Association for Wind Engineering, Geneva, 2014
25. Wium, J.A., Retief, J.V., Viljoen, C., *Lessons from development of design standards in South Africa*, 37th IABSE Symposium, Madrid, 2014
26. Smit, C., Barnardo-Viljoen, C.: *Reliability based optimisation of concrete structural components,* IPW11: The 11th International Probabilistic Workshop, Brno, 2013
27. Retief, J.V., Barnardo-Viljoen, C., Holicky, M.: *Probabilistic models for design of structures against wind loads,* SEMC: The 5th International Conference on Structural Engineering, Mechanics and Computation, Cape Town 2013
28. Holicky, M., Sykora, M., Barnardo-Viljoen, C., Mensah, K.K., Retief, J.V.: *Model uncertainties in reliability analysis of reinforced concrete structures,* SEMC: The 5th International Conference on Structural Engineering, Mechanics and Computation, Cape Town 2013
29. Mensah, K.K., Barnardo-Viljoen, C., Retief, J.V.: *A comparison of the variable strut inclination and alternative stirrup design methods,* SEMC: The 5th International Conference on Structural Engineering, Mechanics and Computation, Cape Town 2013
30. Mensah, K.K., Retief, J.V., Barnardo-Viljoen, C.: *Reliability based application of Eurocode 2's Variable Strut Inclination Method for shear*, ICOSSAR: The 11th International Conference on Structural Safety and Reliability, New York, 2013
31. Barnardo-Viljoen, C., Van der Klashorst, E., Retief, J.V., Diamantidis, D.: *Extreme actions and climate change: Experience gained in South Africa and Germany*, ICOSSAR: The 11th International Conference on Structural Safety and Reliability, New York, 2013
32. Mensah, K.K., Retief, J.V., Barnardo-Viljoen, C.: *Eurocode 2's variable strut inclination method for shear, its modelling uncertainty, and reliability calibration*, FIB symposium, Tel Aviv, 2013
33. Mensah, K.K., Retief, J.V., Barnardo-Viljoen, C.: *Review of the reliability basis of structural design and its application to structural concrete in South Africa*, ACCTA: , Johannesburg, 2013
34. Fischer, K., Barnardo, C., Faber, M.H..: *Deriving target reliabilities from the LQI*, LQI symposium, Kgs. Lyngby, Denmark, 2012

35. Retief, J.V., Barnardo, C., Dithinde, M.: *Reliability basis for adopting Eurocodes as South African standards*, The 11th International Conference on Applications of Statistics and Probability in Civil Engineering, Zurich, Switzerland, 2011
36. Dunaiski, P.E., Retief, J.V., Barnardo, C.: *Harmonization of South African Standards for Structural Design to International Practice*, The 9th Pacific Structural Steel Conference, Beijing, China, October 19-22, 2010.
37. Mensah, K.K., Retief, J.V., Barnardo, C.: *Structural Reliability and the Basis of Design for Concrete Structures*. SEMC: The 4th International Conference on Structural Engineering, Mechanics and Computation, Cape Town 2010.
38. Maincon, P., Barnardo, C., Larson, C.M.: *VIV Force Estimation using Inverse FEM*, International Conference on Offshore Mechanics and Arctic Engineering, Estoril, Portugal, June 15-20, 2008, OMAE2008-57325
39. Barnardo, C., Maincon, P.: *Inverse FEM – IV: Influence of modelling error*. SEMC The 2nd International Conference on Structural Engineering, Mechanics and Computation, Cape Town 2004.

POST-GRADUATE STUDENT SUPERVISION

DEng students

Graduated:

1. Retief, JV., *Contributions to the implementation of the principles of reliability to the standardised basis of structural design*, promotors Prof GPAG van Zijl & Dr C Viljoen, December 2015
2. Goliger, A., *Wind engineering science and its role in optimising the design of the built environment*, promotors Prof JV Retief & Dr C Viljoen, March 2016

PhD students

Graduated:

3. Botha, J. *Probabilistic modelling of the design wind load for South Africa,* study leaders Dr C Viljoen & Prof JV Retief, December 2016.
4. Walls, R. *A beam finite element for the analysis of structures in fire*, study leaders Dr C Viljoen & Dr H De Clercq, December 2016.
5. Mensah, KK., *Reliability Assessment of structural concrete with special reference to stirrup design*, study leaders Dr C Viljoen & Prof JV Retief, March 2015
6. Cloete, GC., *Risk based dam safety in Namibia: a quantitative approach*, study leaders Prof G Basson, Prof JV Retief & Dr C Viljoen, March 2015

Registered:

7. McLeod, M. *Calibration of a South African serviceability crack width prediction model for use in the design of water retaining structures*, study leader Prof C Viljoen, graduation expected December 2018.
8. Olalusi, O.B. *Reliability assessment and calibration of VSIM shear design*, study leader Prof C Viljoen, graduation expected December 2018
9. Saffou, E. *Geomechanical characterisation and probabilistic risk assessment for a CO2 storage project in the F-O gas field, South Africa: A feasibility study*, study leaders Drs L Croucamp & D Turner & Prof C Viljoen, graduation expected December 2018.
10. De Koker, N. *Reliability based design in geotechnical engineering*, study leaders Profs P Day & C Viljoen, graduation expected December 2018.
11. Van der Klashorst, E. *Behaviour and design of Cold-Formed Composite floor systems*, study leaders Profs C Viljoen & H de Clercq, graduation expected December 2020.

Prospective:

12. Way, A. *Assessment of reliability- and economic implications of adopting EN1992-1-1 crack width provisions in SANS 10100-3.* Study leaders Prof C Viljoen.
13. Asante, S. *Calibration of SANS 10160-7 geotechnical design provisions*, study leaders Profs C Viljoen & P Day.

MEng [Research] students

Graduated:

1. Bauer, A., *Reliability assessment of cold formed steel columns designed using the direct strength method*, March 2016. Study leaders Dr C Viljoen & Mr E van der Klashorst.
2. Stolk, W., *Investigation of the implicit reliability of optimal portal frames, including serviceability considerations*, December 2015. Study leaders Mr E van der Klashorst & Dr C Viljoen.
3. Van Wyk, R., *Reliability of cold-formed steel connections and tilt-and-bearing*, December 2014. Study leader Dr C Viljoen.
4. Smit, C., *Reliability Based Optimization of Concrete Structural Components,* March 2014. Study leader Dr C Viljoen.

5. Reynolds, S., *Evaluating the decision criteria for the prioritisation of South African dams for rehabilitation in terms of risk to human lives,* March 2013. Study leader Dr C Viljoen.
6. Schoeman, S., *Identifying trends and relationships between key performance indicators to aid municipal management and decision making,* December 2012. Study leader Dr C Viljoen.
7. Oosthuizen, T., *Probabilistic based calibration between SANS 10160 and 10162:2*, 2011. Study leader Dr C Viljoen.

Upgraded to PhD:

8. Mensah, KK., *Structural reliability and basis of design for concrete structures*. Upgraded to PhD, 2012.
9. Botha, J. *Establishment of the strong-wind design characteristics for South Africa in terms of wind engineering and reliability principles as input to SANS 10160.* Upgraded to PhD, 2014

Registered:

10. Van Nierop, S., *Target reliability for structures governed by SLS design considerations, with special reference to concrete liquid retaining structures.* Study leaders Prof C Viljoen & Dr R Lenner, graduation expected December 2017.
11. West-Russell, M., *Reliability assessment of cold formed steel columns designed according to SANS 10160 and SANS 10162*. Study leaders Prof C Viljoen & Mr E van der Klashorst, graduation expected December 2017.