# Mohammad Mehdi Kashani

*Curriculum Vitae*

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## Personal Information

Date of Birth: 07/07/1982
Nationality: British-Iranian

## Present Appointment

Lecturer (Assistant Professor) in Structural Mechanics and Earthquake Engineering, University of Bristol, Bristol, UK (September 2013 - Date)

## Previous Appointments

Structural Engineer, Specialised Structures Team
URS Infrastructure and Environment UK Limited (2006-2012)

Part-time PhD Research Student
University of Bristol (2008 - 2014)

Visiting Scholar, Department of Civil and Environmental Engineering
University of Washington, Seattle, USA (January 2013 – September 2013)

## Academic Qualifications

**PhD Structural/Earthquake Engineering, University of Bristol**, Bristol-UK, 2014
Thesis: *Seismic Performance of Corroded RC Bridge Piers: Development of a Multi-Mechanical Nonlinear Fibre Beam-Column Model*

**MSc Structural Engineering, University of Surrey**, Guildford-UK, 2006
Dissertation: *Estimating Transition Probabilities in Markov Chain-Based Deterioration for Chloride-Induced Corrosion*

**BSc (Honours) Construction Engineering, Shahid Rajaee University**, Tehran-Iran, 2005

## Awards and Honours

**Worldwide University Network - Research Mobility Programme, University of Bristol (2012)**
Funding grants for research collaboration with Civil Engineering Department of the University of Washington.
Title: *Development of modelling strategies for nonlinear seismic performance analysis of corrosion damaged RC bridge piers.*

**Runner-up, Young Researchers Conference, Institution of Structural Engineers, UK (2010)**
Title: *Seismic performance of corrosion damaged RC bridges in earthquake regions*

**Winner of the Graduates and Students Paper Competition, Institution of Civil Engineers, South Branch (2008)**
Title: *Modelling chloride induced corrosion service life of concrete bridge half-joints*

## Membership of Professional Bodies

Graduate member of the Institution of Civil Engineers (ICE) – (2007 – date)
Plan to take the professional review (CPR) in autumn 2015.
Graduate member of the Institution of Structural Engineers (IStructE) – (2011 – date)
Plan to take the exam in April 2016.
Member of the Society for Earthquake and Civil Engineering Dynamics (SECED) – (2008 – date)
Member of American Concrete Institute (ACI) – (2007 – date)

## Publications

**Peer Reviewed Journal Papers:**

[1] *Mohammad M. Kashani*, Adam J. Crewe, Nicholas A. Alexander (2013), Nonlinear stress-strain behaviour of corrosion-damaged reinforcing bars including inelastic buckling, ***Engineering Structures***, (48) 417– 429.

[2] *Mohammad M. Kashani*, Adam J. Crewe, Nicholas A. Alexander (2013), Nonlinear cyclic response of corrosion-damaged reinforcing bars with the effect of buckling, ***Construction and Building Materials***, (41) 388– 400.

[3] *Mohammad M. Kashani*, A. J. Crewe (2011), Seismic performance of corrosion damaged RC bridges in earthquake regions, ***The Structural Engineer,*** 89 (14) 16 – 19.

[4] *Mohammad M. Kashani*, Adam J. Crewe, Nicholas A. Alexander (2013), Use of a 3D optical measurement technique for stochastic corrosion pattern analysis of reinforcing bars subjected to accelerated corrosion, ***Corrosion Science***, (73) 208–221.

[5] *Mohammad M. Kashani*, Laura N. Lowes, Adam J. Crewe, Nicholas A. Alexander, (2014), Finite element investigation of the influence of corrosion pattern on inelastic buckling and cyclic response of corroded reinforcing bars , ***Engineering Structures***, (75) 113– 125.

[6] *Mohammad M. Kashani*, Laura N. Lowes, Adam J. Crewe, Nicholas A. Alexander, (2015), Phenomenological hysteretic model for corroded reinforcing bars including inelastic buckling and low-cycle fatigue degradation, ***Computers and Structures***. Under Review.

[7] *Mohammad M. Kashani*, Laura N. Lowes, Adam J. Crewe, Nicholas A. Alexander, (2015), Nonlinear fibre element modelling of RC bridge piers considering inelastic buckling of reinforcement, ***Engineering Structures.*** Under Review.

[8] *Mohammad M. Kashani*, Laura N. Lowes, Adam J. Crewe, Nicholas A. Alexander, (2015), Nonlinear fibre element modelling of corrosion damaged RC bridge piers, ***Computer-Aided Civil and Infrastructure Engineering***. Under Review.

[9] *Mohammad M. Kashani*, Laura N. Lowes, Adam J. Crewe, Nicholas A. Alexander, (2014), Multi-mechanical nonlinear fibre beam-column model for corroded columns, ***International Journal of Structural Integrity.*** **Invited paper,** Accepted for publication.

[10] Mairéad Ni Choine, *Mohammad M. Kashani*, Laura N. Lowes, Alan O'Connor, Adam J. Crewe, Nicholas A. Alexander, Jamie E. Padgett, (2015), Nonlinear dynamic analysis and seismic fragility assessment of a corrosion damaged integral bridge, ***International Journal of Structural Integrity.*** **Invited paper,** Accepted for publication.

[11] *Mohammad M. Kashani***,** Aneeka K. Barmi, Viktoria S. Malinova, (2015), Influence of inelastic buckling on low-cycle fatigue degradation of reinforcing bars, ***Construction and Building Materials.*** Under Review.

[12] *Mohammad M. Kashani*, Peyman Alaghehband, Rafid Khan, (2015), Influence of corrosion on low-cycle fatigue degradation of reinforcing bars with the effect of inelastic buckling, to be submitted to ***International Journal of Fatigue.***

**Chapters in Books:**

[1] Matt Dietz, Luiza Dihoru, Olafur Oddbjornsson, Mateusz Bocian, ***Mohammad M. Kashani***, James A.P. Norman, Adam J. Crewe, John H.G. Macdonald, and Colin A. Taylor (2011), Earthquake and Large Structures Testing at the Bristol Laboratory for Advanced Dynamics Engineering, *M.N. Fardis and Z.T. Rakicevic (eds.), Role of Seismic*

*Testing Facilities in Performance-Based Earthquake Engineering: SERIES Workshop, Geotechnical,Geological and Earthquake Engineering (22),* DOI :10.1007/978-94-007-1977-4_2.

**Peer Reviewed Conference Papers:**

[1] *Mohammad M. Kashani*, Laura N. Lowes, Adam J. Crewe, Nicholas A. Alexander, (2015), Reliably predicting the nonlinear cyclic response of RC bridge piers up to complete collapse, Submitted to *SECED 2015 Conference, Earthquake Risk and Engineering towards a Resilient World, Cambridge.*

[2] *Mohammad M. Kashani*, Laura N. Lowes, Adam J. Crewe, Nicholas A. Alexander, (2015), Nonlinear behaviour of corroded RC columns under cyclic loading. Submitted to 7th International Conference on Seismology and Earthquake Engineering, Tehran.

[3] Mohammad R. Salami, Katsu Goda, *Mohammad M. Kashani*, (2015), Seismic performance of RC buildings subjected to mainshock-aftershock sequences. Submitted to 7th International Conference on Seismology and Earthquake Engineering, Tehran.

[4] *Mohammad M. Kashani*, Laura N. Lowes, Adam J. Crewe, Nicholas A. Alexander, (2014), Implementation of corrosion damage models in nonlinear fibre beam-column element, *10th U.S. National Conference on Earthquake Engineering, Alaska*.

[5] *Mohammad M. Kashani*, Laura N. Lowes, Adam J. Crewe, Nicholas A. Alexander, (2014), Modelling nonlinear behaviour of corrosion damaged RC bridge piers subject to cyclic loading, Harmful Algae Blooms in Drinking Water: Removal of Cyanobacterial Cells and Toxins 1 (2014): 304. Presented at Life-Cycle of Structural System, Tokyo.

[6] Mairéad Ni Choine, *Mohammad M. Kashani*, Laura N. Lowes, Alan O'Connor, Adam J. Crewe, Nicholas A. Alexander, Jamie E. Padgett, (2014), Nonlinear dynamic response of a multi-span integral bridge with corrosion damaged RC piers. Harmful Algae Blooms in Drinking Water: Removal of Cyanobacterial Cells and Toxins 1 (2014): 283. Presented at Life-Cycle of Structural System, Tokyo.

[7] *Mohammad M. Kashani, Adam J. Crewe, Nicholas A. Alexander, Laura N. Lowes,* (2013), Experimental investigation and computational modelling of corrosion induced mechanical-geometrical degradation of reinforcing bars, *11th International Conference on Structural Safety and Reliability, New York.*

[8] *Mohammad M. Kashani*, Adam J. Crewe, Nicholas A. Alexander (2012), Stress-strain response of corroded reinforcing bars under monotonic and cyclic loading, *15th World Conference on Earthquake Engineering, Lisbon, Portugal.*

[9] *Mohammad M. Kashani*, Adam J. Crewe, Nicholas A. Alexander, (2012), Durability considerations in performance-based seismic assessment of deteriorated RC bridges, *15th World Conference on Earthquake Engineering, Lisbon, Portugal.*

[10] *Mohammad M. Kashani*, (2012), Seismic Performance Evaluation of RC Bridge Piers Subject to Combined Earthquake Loading and Material Deterioration in Aggressive Environment, *The 9th fib International PhD Symposium in Civil Engineering, Karlsruhe Institute of Technology (KIT), Germany.*

[11] *Mohammad M. Kashani*, Adam J. Crewe, (2010), Curvature ductility and displacement-based assessment of corrosion damaged RC bridge piers in seismic zones, *Proceeding of SECED Young Engineers Conference, London, CD-ROM Proceeding.*

[12] *Mohammad M. Kashani*, Adam J. Crewe, T.D.G. Canisius, (2010), Ductility of corrosion damage RC bridges in seismic assessment, T*he 5th International ASRANet Conference, Edinburgh, CD-ROM Proceeding.*

[13] *Mohammad M. Kashani*, Adam J. Crewe, (2009), Modelling chloride induced corrosion service life of concrete bridge half-joints, *Proceeding of the fib Conference, Concrete 21st Century Super Hero, London, CD-ROM Proceeding.*

## Organising Workshops and Conferences

Organiser of the first OpenSees@Bristol, Modelling nonlinear behaviour of structural systems (2014), The aim of this joint workshop between the University of Bristol, the University of Washington, the University of California Berkeley and the Pacific Earthquake Engineering Research Centre (PEER) was to share the latest advances in computational techniques in modelling nonlinear behaviour of structural systems under extreme loading. The event will bring researchers from the US and the UK/EU together to exchange ideas and explore opportunities for future collaboration.

## Conference Presentations and Invited Lectures

Paper presentation at the 10th U.S. National Conference on Earthquake Engineering, Alaska (2014)

Presentation at the Quake Summit 2013, University of Nevada Reno, Reno (2013)

Paper presentation at *11th International Conference on Structural Safety and Reliability, New York* (2013)

Invited speaker for Structural Engineering research seminar at University of Washington, Seattle (2013)

Paper presentation at the 15th World Conference on Earthquake Engineering, Lisbon (2012)

Paper presentation at the 9th PhD Symposium in Earthquake Engineering, Karlsruhe (2012)

Invited speaker for an evening lecture about structural engineering at the University of Bristol, IStructE Western Countries Branch, University of Bristol (2011)

Paper presentation at the Young Engineers Conference of the ICE Society for Earthquake and Civil Engineering Dynamics (SECED), UCL (2010)

Paper presentation at 5th International ASRANet Conference, Edinburgh (2010)

Paper presentation at Institution of Structural Engineers Young Researchers Conference, IStructE International HQ London (2010)

Paper presentation at the *fib* Conference, London (2009)

Paper presentation at the ICE Graduates and Students Paper Competition, Basingstoke (2009)

Several Lunchtime seminars for URS (2008-2012)

**Poster Presentations:**

*Mohammad M. Kashani*, Stress-strain response of corroded reinforcing bars under monotonic and cyclic loading, e-poster, at 15th World Conference on Earthquake Engineering, Lisbon, Portugal (2012)

*Mohammad M. Kashani*, Seismic performance of corrosion damaged RC bridges in earthquake regions, poster, at the Institution of Structural Engineers Young Researchers Conference, London, UK (2010)

## Research Supervision Experience

Co-supervisor of a PhD student with Dr Katsu Goda, University of Bristol (August 2014 – Date)
Research subject: *Seismic Performance of Structures Considering Mainshock-Aftershock Sequences*

Supervised two undergraduate students for 3rd year research project. University of Bristol (213-2014)
Research subject: *An Experimental Investigation of the Influence of Buckling Length on the Low-Cycle Fatigue Life of Reinforcing Bars*

Supervised two undergraduate students for 3rd year research project. University of Bristol (213-2014)
Research subject: *Experimental Investigation of the Influence of Corrosion on Low-Cycle Fatigue Life of Corroded Reinforcing Bars with the Effect of Buckling*

Supervised two undergraduate students for 3rd year research project. University of Bristol (213-2014)

Research subject: *The Effect of Synthetic Fibre Reinforced Concretes on The Corrosion of Reinforcing Steel*

Co-supervised a summer internship student joint with Dr Adam Crewe, University of Bristol (June 2011 – September 2011)
Research subject: *Experimental Investigation of Cyclic Stress-Strain Behaviour of Corroded Reinforcing Bars*

Co-supervised two undergraduate students in the third year student research project joint with Dr Adam Crewe, University of Bristol (2010-2011)
Research subject: *Effect of Corrosion on Stress-Strain Behaviour of Corroded Bars under Monotonic Loading*

Co-supervised an undergraduate in the third year student research project joint with Dr Adam Crewe, University of Bristol (2008-2009)
Research subject: *"Effect of Reinforcement Corrosion on Seismic Performance of Concrete Bridges"*

## Administrative Work Experience

**Committee Member of the Society for Earthquake and Civil Engineering Dynamics (SECED), UK (2009 – 2011)**
This involved attending the monthly meeting and helping to organised the evening ICE meetings, inviting speakers and promoting the earthquake engineering research in the UK industry and universities.

**Vice-chair of the Graduates and Students Committee of the ICE South Branch (2008 – 2009)**
This involved chairing monthly G&S meetings, managing ICE G&S events and representing ICE at schools and universities.

**Organiser of the NCE communication competition for the ICE South Branch (2007 – 2008)**
This involved organising the venue, referees and chairing the evening.
**Member of Graduates and Student committee of the ICE South Branch (2007 – 2008)**
This involved organising different ICE events as well as some voluntary works for promoting civil engineering at schools (e.g. ICE representative at Science Festival in Brighton in February 2008).

**Student representative of Structural Engineering section at the University of Surrey**
This involved representing the views of students to the department (2005 – 2006).

**Student representative of concrete research group at undergraduate level (2004)**

Shahid Rajaee University for ACI student competition

## Teaching Experience

**Lecturer of Structural Engineering 2, University of Bristol (2013-Date)**

**Teaching Assistant, University of Bristol (2011-2012)**
Structural Engineering I and II,
Civil Engineering Design II (RC and Steel Design)

**Eurocode Design, URS (2010-2012)**
Teaching Eurocode design to recent graduates within URS

**Finite Element Design of RC Structures, URS (2009-2012)**
Teaching finite element and structural modelling using LUSAS and STAAD Pro to graduate engineers

**Eurocode Presentations, URS (2010-2012)**
Several lunchtime CPD presentations within the URS about implementation of Eurocode in the UK industry and research

**Integrated Design, URS (2010-2012)**
Mentoring junior graduate structural engineers

## Research Grants

**Partial industry funding for PhD research**
Funding body URS (2008-2012)
Value £28,275

**Funding for research collaboration with University of Washington**
Funding body Worldwide University Network - Research Mobility Programme (2012)
Value £2,650

## Research Expertise and Collaboration

**Experimental Earthquake Engineering**

- Cyclic reaction wall test of large scale corrosion-damaged RC columns/bridge piers.
- Cyclic bending test of corrosion-damaged RC beams.
- Development of accelerated corrosion simulation technique at Bristol University.

- Experimental investigation of the nonlinear constitutive behaviour of corrosion-damaged reinforcing bars subject to tension and compression including inelastic buckling.
- Experimental investigation of nonlinear cyclic response of corrosion-damaged reinforcing bars with effect of inelastic buckling and low-cycle high amplitude-fatigue.

**Analytical and Computational Techniques**

- Development of a uniaxial constitutive material model for modelling post-yield bulking behaviour of corroded bars under monotonic and cyclic loading.
- Development of a low-cycle fatigue model for prediction of cumulative damage due to low-cycle high amplitude fatigue degradation of the corroded reinforcing bars.
- Nonlinear material model development and implementation in OpenSees.
- Development of a coupled structural environmental damaged-based moment-curvature computer code for capacity check and inelastic section response of corrosion damaged RC sections with various axial forces.
- Development of a multi-mechanical nonlinear fibre-based finite element computer code in MATLAB for pushover analysis of corrosion damaged RC columns.
- Mathematical modelling and service life prediction of corroded RC structures
- Modelling Life Cycle Cost (LCC) analysis of deteriorating systems

## Academic Leadership and Citizenship

**ICE representative in National Science Day exhibition in Brighton (2008)**
This involved presentation for school children aged 8 to 14, work including preparation of a building a bridge with paper competition for children to promote the civil engineering interest among school children.

**ICE university representative (2008-2009)**
This involved several presentations to undergraduate students at universities in south region.

## Relevant Design Experience in Industry

**URS Infrastructure and Environment UK Limited (2006-2012)**

**London Cable Car (Emirates Airline)**
January 2011 – September 2011
Value £64M Completion 2012

Mehdi was responsible for the structural analysis and design of North Station at the Royal Victoria Dock. The structure accommodates cable car system and is supported by steel-

composite pile-columns in 11m deep water. The design included finite element modelling of the structure including soil-structure interaction of pile-columns, buckling analysis of pile-columns, interaction of North Station and North Compression tower due to displacement induced by cable tension of cable car system. Mehdi developed a fast and economic method of construction for this complex system during the tender design which is now in detail design process. Design is being done according to Eurocode. Work required reporting to the Lead Structural Engineer and working closely with the geotechnical engineers, architects and M&E engineers as well as managing CAD technicians.

**Independent CAT III Check - Royal Arsenal Woolwich Station Box (Crossrail)**
October 2011 – June 2012
Value £100M Completion 2018

Mehdi was the structural engineer responsible for the structural analysis and capacity check of the station box. The station box dimensions 256m long (45m West End, 173m Central Box, and 38m East End). The Central Box is 20.4m wide and West and East Ends are 26.6m respectively. The check includes finite element modelling and analysis of RC slabs and columns, structural capacity check of main structural elements (diaphragm wall, slabs, columns, piles etc.), construction sequence, reviewing drawings and coordination between the designers (Waterman Group and Arup) and Crosrail.

**Independent CAT III Check, Bond Street Station Box, East Ticket Hall (Crossrail)**
April 2012 – June 2012
Value £300M Completion 2018

Mehdi was the structural engineer responsible for the structural analysis and capacity check of the station box. Work included a comprehensive detailed load take down for the entire station, finite element modelling and analysis of RC slabs and levels -2 and -4 for permanent and construction stage, reviewing drawings and capacity check of main structural elements (slabs, beams, columns, plunge columns and waling beams etc.).

**Paddington Crossrail Station, London – Package C130**
October 2009 – December 2010.
Value £220M Completion 2018.
Mehdi was the engineer responsible for the Stage D (preliminary design) and E (detail design) design of the District &Circle Line link (cut and cover tunnel), step free access, elements of the Paddington Station Box (300m long and 25m deep) and Network Rail Entrance to the main box. The design included the London Underground and Network Rail interfaces, design and investigation of construction stages and constructability. In addition it involved the design of structural elements and temporary works within the main box including temporary steel waling beams, props, plunge columns and permanent elliptical concrete columns at the central section of the main box. Design has been done according to Crossrail design criteria and Eurocode. Works also required weekly report to the Senior

Design Professional and Design Manager and work closely with the geotechnical engineers, architects, M&E engineers and constructability experts.

**Farringdon Crossrail Station, London – Package C136**
August 2009-September 2009
Value £200M Completion 2017

The designer of temporary steelworks for the East and West ticket halls comprising two concrete deep shafts (diaphragm wall and secant pile wall construction approximately 30m deep) for bottom up construction. This also involved investigation of adapting a semi-top down construction for these shafts at Stage D scheme design. Design was done according to Crossrail criteria and Eurocode.

**Abu Dhabi Waste Water Treatment Plant**
February 2009-August 2009
Value $400M Completion 2010

Mehdi was the designer of two circular concrete de-aerator tanks and two buffer tanks as well as two gas holder and flare structures. The design work included structural modelling and design of water retaining tanks from preliminary design stage to construction. During this process, Mehdi was responsible for preparation of general arrangement and structural detail sketches for the CAD technicians, drawing checks, progress monitoring and project management liaison.

**Stratford City Olympic Bridges - Assessment of Existing Bridge 14**
February 2009-March 2009

Mehdi was responsible for structural assessment of a single span steel-concrete composite integral bridge to check the effect of widening and adding a new traffic lane to the bridge as part of the Stratford city development.

**A421 Improvements M1 Junction 13 to Bedford**
April 2008-January 2009
Value £180M Completion 2010

Mehdi was responsible for detail design of the whole package of box culverts, wing walls and headwalls (twelve major and eleven minor culverts) in A421 team and design of a number buried steel corrugated structures. He also deigned North Common Farm Underpass, Brogborough Bridge on M1 and Marston Bridge substructures (steel composite integral bridge). The work included 3D shell finite element model to analyse the effect of dead and live load together with soil-structure interaction, design of Piers, foundations, piles and pile caps for both vertical loads and collision loading.

**North Cross Footbridge Replacement – Plymouth**
January 2008 - April 2008

Independent Categories III check on the design on 35m span warren truss footbridge. The check was included vibration serviceability, aerodynamic excitation (3D dynamic analysis), U-frame action on the bridge and connections as well as check on the bridge support to sustain the collision loading.

**Area 3 Highways Agency, Half Joints Assessment**
April 2007- April 2008

Assessment and preparation of material testing reports of Concrete Bridge half-joints, Including the analysis and assessment of structural adequacy of half-joints plus modelling of chloride induced corrosion service life of these bridges and carrying out the qualitative risk assessment according to IAN 53/04.

**Area 3 Highways Agency, Steady State Assessment**
January 2008 - April 2008

Assessment of existing concrete bridge decks subject to live loading in M3, including assessment of pre-stressed beams and solid slab decks as well as writing the assessment report for client.

**Karachi Port Trust (KPT) Bridges Survey – Pakistan**
November 2007

Mehdi was responsible for design review using existing loading conditions (overloaded trucks) and visual survey of eight bridge/underpass structures at Karachi Port. The work included checks on quality of construction and provision of a comprehensive report on the current condition of the bridges.

**Area 3 Highways Agency, At Risk Piers**
April 2007- April 2008

Assessment of existing bridge piers subject to collision loading, feasibility studies for strengthening/protection of piers, including whole life costing and prioritisation to IAN 91/07.

**East London Line**
January 2007- March 2007
Mehdi was responsible for preparation of standard details and drainage design for structural works. Work included Dalston Junction, Shorditch, Hoxton and Haggerston Stations and Holywell Viaduct. Mehdi also did the detail design of Dalston Station attenuation tank foundation.

**Other small projects (2006 to 2007)**

**Area 3 Highways Agency, BACO Parapet Upgrade**
Assessment, design and strengthening of A31 and M3 bridge parapets, according to BD 37/01 and IAN 97/07.

**Area 3 Highways Agency A34 Footbridges - Feasibility Study and Design**
Check of feasibility study and design options for two crossings and preparation of environmental appraisal drawings.

**Crystal palace Railway Station**
Preparation of preliminary drainage design to proposed bay platform.
**Stourbridge Junction Railway Station**
Design and production of foul water and sewer drawings.
**Shannon Airport, Ireland**
Pavement rehabilitation project. Assessment of geomechanical compliance.

## References

Reference is available upon request.