CURRICULUM VITAE

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EDUCATION:

08/2016 – 08/2017	**California Institute of Technology (Caltech)**, California, USA. Postdoctoral scholar in Aerospace.
09/2011 – 07/2016	**Northwestern University**, Illinois, USA Ph.D degree in Mechanical Engineering. Dissertation: *Data-driven Multi-scale Analyses of Materials and Structures.* Advisers: Wing Kam Liu and Ted Belytschko. GPA: 4.0 out of 4.0.
09/2005 – 07/2010	**University of Porto**, Portugal Integrated B.S./M.S. degree in Mechanical Engineering. Dissertation: *Meso-Mechanical Model of the Structural Integrity of Advanced Composite Laminates.* Adviser: Pedro Camanho Graduation with highest honors (1st ranked). Dissertation grade: 20 out of 20.

PROFESSIONAL EXPERIENCE:

08/2017 – present	**Delft University of Technology (TU Delft)**, The Netherlands. Assistant Professor in the Faculty of Mechanical, Maritime and Materials Engineering.
08/2010 – 07/2011	**University of Porto**, Portugal. Research assistant sponsored by the Portuguese Foundation for Science and Technology.

AWARDS & HONORS:

Research awards:

2019	**NWO Veni**. Personal grant from the Netherlands Organization for Scientific Research.
2011 – 2016	**FULBRIGHT Ph.D scholarship**.
2013 – 2015	**FCT Ph.D scholarship**. Portuguese Foundation for Science and Technology fellowship towards the completion of the Ph.D degree.
2012 – 2013	**Ted Belytschko's Walter P. Murphy fellowship**.
2012	**PS&ED fellowship**. Predictive Science & Engineering Design fellowship.
2010 – 2011	**FCT Research scholarship**. Portuguese Foundation for Science and Technology fellowship for researchers with a M.S. degree.
2010	**FCT M.S. scholarship**. Portuguese Foundation for Science and Technology fellowship towards the completion of the M.S. degree.

Teaching awards:

2014	**Graduate Teaching Fellow**. Highest teaching award attributed to graduate students by Northwestern University. Eight awards attributed in the entire University for this academic year.
2013	**NTAC Workshop Leader** for outstanding Northwestern teaching assistants (TAs).

Outreach awards:

2019   **US Embassy in Lisbon Small Alumni grant** for the Bridging Insularity Through STEM (BITS) project. Funding used in Science outreach activities and a Seminar for elementary school students and researchers based in Madeira island.

University of Porto awards:

2010   **ColepCCL award**. Award attributed to the student with highest GPA in Mechanical Engineering at the University of Porto.

2006 – 2009   **"FEUP Merit award"** (4 consecutive times in 4 possible). This highly competitive award is the most prestigious prize awarded by the School of Engineering of the University of Porto. No other Mechanical Engineering student, either working towards the B.S. or M.S. degree, has received this award except in year 2009 (which was also attributed to another student).

2006   **"Incentive Prize"**. This award is attributed by the University of Porto to the best students of each school who completed the first year of studies towards a B.S. degree. For the Engineering school 4 students were distinguished.

Travel awards:

2015   **USNCCM13 travel award**.

TEACHING EXPERIENCE:

As **Instructor**:

Fall 2019   **Materials for Lightweight Constructions** (ME43010). Co-instructor of graduate course in Mechanical Engineering at TU Delft. (No student feedback provided)

Fall 2019   **Non-metallic Materials in Marine Structures** (MT44010). Co-instructor of graduate course in Maritime Engineering at TU Delft. Students' feedback report: **9.3 out of 10**.

Spring 2018   **Mechanical Behavior of Materials** (MS43025). Co-instructor of graduate course in Materials Science at TU Delft. Students' feedback report: **8.45 out of 10**.

Spring 2018   **Computational Materials Science I** (MS44020). Guest lectures in this graduate course in Materials Science at TU Delft.

Fall 2017   **Advanced Materials in Marine Structures** (MT44010). Graduate level course in Maritime Engineering at TU Delft.

Winter 2013   **Advanced Finite Elements I** (ME/CEE-426-1). Co-instructor of graduate course in Mechanical and Civil Engineering at Northwestern University. Students' feedback report: **5.775 out of 6.0**.

2011   **Technical Drawing**. Undergraduate course in Mechanical Engineering at University of Porto. Students' feedback report: **A** – grade given to top 10% of instructors of entire school of engineering during that academic year.

As **Teaching Assistant**:

Fall 2013   **Multi-scale Modeling and Simulation in Solid Mechanics** (ME 417). Graduate course in Mechanical Engineering at Northwestern University. Instructor: Professor Wing Kam Liu. Students' feedback report: **5.618 out of 6.0**.

Spring 2013   **Advanced Finite Elements II** (ME/CEE-426-2). Graduate course in Mechanical and Civil Engineering at Northwestern University. Instructor: Professor Wing Kam Liu. (No student feedback provided)

As **Monitor**:

2008 – 2009   "Projecto FEUP". Research tutorials to 1st year students at University of Porto.

ASSOCIATIONS:

2017   **Executive board member** of the Caltech Postdoctoral Association (outreach coordinator).

2015 – 2016   **Founder and president** of the Northwestern student chapter of the U.S. Association for Computational Mechanics.

CONFERENCE PRESENTATIONS & INVITED TALKS:

31/07/2019	**Semi-plenary lecture (forthcoming)**, 15th U.S. National Congress on Computational Mechanics, Austin, TX, USA.
10/03/2019	**Invited talk**, The Minerals, Metals and Materials Society (TMS) conference, San Antonio, TX, USA.
14/01/2019	**Invited talk**, AMOLF, Amsterdam, The Netherlands.
04/01/2019	Science outreach talk, University of Madeira, Portugal.
23/10/2018	**Invited talk**, Department of Engineering, Cambridge University, United Kingdom.
16/10/2018	**Invited talk**, Department of Computer Science, Technical University of Braunschweig, Germany.
17/08/2018	**Invited talk**, Department of Mechanical Engineering, Ruhr University, Bochum, Germany.
23/07/2018	13th World Congress on Computational Mechanics, New York, NY, USA.
02/07/2018	**Keynote talk**, 10th European Solid Mechanics Conference (ESMC), Bologna, Italy.
05/06/2018	Short-course on "Mechanistic Data-driven Multiscale Analysis and Applications" at USNCTAM 2018, Chicago, IL, USA.
26/03/2018	**Invited talk**, 2nd International Conference on Simulation Technology (SimTech 2018), Stuttgart, Germany.
22/01/2018	**Invited talk**, Department of Mechanical Engineering, TU Eindhoven, The Netherlands.
20/12/2017	**Invited talk**, Advanced Computing for Earth Sciences (ACES 2017), Porto, Portugal.
26/11/2017	**Invited talk**, Department of Mechanical Engineering, University of Paris-Est, Marne-La-Vallé, France.
26/09/2017	Annual symposium of the International Association for Shell and Spatial Structures (IASS 2017), Hamburg, Germany.
07/18/2017	14th U.S. National Congress on Computational Mechanics, Montreal, QC, Canada.
05/02/2017	**Invited talk**, Faculty of Mechanical, Maritime and Materials Engineering, TU Delft, The Netherlands.
03/10/2017	**Invited talk**, Mechanical and Industrial Engineering Department, Northeastern University, Boston, MA, USA.
11/02/2016	**Invited talk**, Aerospace Engineering Department, TU Delft, The Netherlands.
03/30/2016	**Invited talk**, Structural Engineering Department, University of California, San Diego, CA, USA.
03/28/2016	**Invited talk**, Mechanical and Aerospace Engineering Department, University of California, San Diego, CA, USA.
07/27/2015	13th U.S. National Congress on Computational Mechanics, San Diego, CA, USA
07/23/2014	11th World Congress on Computational Mechanics, Barcelona, Spain
07/22/2013	12th U.S. National Congress on Computational Mechanics, Raleigh, NC, USA.
02/26/2012	**Semi-plenary lecture** with Ted Belytschko. Advances in Computational Mechanics – A Conference Celebrating the 70th Birthday of T.J.R. Hughes, San Diego, CA, USA.

PEER-REVIEW ACTIVITIES:

04/2018 – present	**Associate Editor**, Computer Modeling in Engineering & Sciences journal.
Referee for	Nature & Computer Methods in Applied Mechanics and Engineering, International Journal for Numerical Methods in Engineering, Computational Mechanics, Composites Part A, Journal of Micro and Nano-Manufacturing, International Journal of Applied Mechanics, Extreme Mechanics Letters.

JOURNAL PUBLICATIONS: [**Selected publications in bold**]

[1] **M.A. Bessa**, P. Glowacki, and M. Houlder. **Machine learning in metamaterial design: fragile becomes super-compressible**. *Submitted*, 2019.

[2] M. Mozzafar, R. Bostanabad, W. Chen, K. Ehmann, J. Cao, and **M.A. Bessa**. **Foundations for Computational Plasticity with Deep Learning**. *Submitted*, 2019.

[3] L.F. Varandas, A. Arteiro, **M.A. Bessa**, A.R. Melro, and G. Catalanotti. The effect of through-thickness compressive stress on mode ii interlaminar crack propagation: A computational micromechanics approach. *Composite Structures*, 182(Supplement C):326–334, 2017.

[4] **M.A. Bessa**, R. Bostanabad, Z. Liu, A. Hu, Daniel W. Apley, C. Brinson, W. Chen, and Wing Kam Liu. **A framework for data-driven analysis of materials under uncertainty: Countering the curse of dimensionality**. *Computer Methods in Applied Mechanics and Engineering*, 320:633 – 667, 2017.

[5] C. Furtado, A. Arteiro, **M.A. Bessa**, B.L. Wardle, and P.P. Camanho. Prediction of size effects in open-hole laminates using only the young's modulus, the strength, and the r-curve of the 0° ply. *Composites Part A: Applied Science and Manufacturing*, 101:306 – 317, 2017.

[6] J. Zhao, **M.A. Bessa**, J. Oswald, Z. Liu, and T. Belytschko. A method for modeling the transition of weak discontinuities to strong discontinuities: from interfaces to cracks. *International Journal for Numerical Methods in Engineering*, 105(11):834–854, 2016.

[7] R.P. Tavares, A.R. Melro, **M.A. Bessa**, A. Turon, W.K. Liu, and P.P. Camanho. Mechanics of hybrid polymer composites: analytical and computational study. *Computational Mechanics*, 57(3):405–421, 2016.

[8] Z. Meng, **M.A. Bessa**, W. Xia, W.K. Liu, and S. Keten. Predicting the macroscopic fracture energy of epoxy resins from atomistic molecular simulations. *Macromolecules*, 49(24):9474–9483, 2016.

[9] Z. Liu, **M.A. Bessa**, and Wing Kam Liu. **Self-consistent clustering analysis: An efficient multi-scale scheme for inelastic heterogeneous materials**. *Computer Methods in Applied Mechanics and Engineering*, 306:319 – 341, 2016.

[10] Z.P. Bazant, W. Luo, V.T. Chau, and **M.A. Bessa**. Wave dispersion and basic concepts of peridynamics compared to classical nonlocal damage models. *Journal of Applied Mechanics*, 83(11):111004–111004, August 2016.

[11] N. Vu-Bac, **M.A. Bessa**, T. Rabczuk, and W.K. Liu. **A Multiscale Model for the Quasi-Static Thermo-Plastic Behavior of Highly Cross-Linked Glassy Polymers**. *Macromolecules*, 48(18):6713–6723, 2015.

[12] X. Bai, **M.A. Bessa**, A.R. Melro, P.P. Camanho, L. Guo, and W. K. Liu. High-fidelity micro-scale modeling of the thermo-visco-plastic behavior of carbon fiber polymer matrix composites. *Composite Structures*, 134:132 – 141, 2015.

[13] **M.A. Bessa**, J.T. Foster, T. Belytschko, and Wing Kam Liu. **A meshfree unification: reproducing kernel peridynamics**. *Computational Mechanics*, 53(6):1251–1264, 2014.

[14] P.P. Camanho, **M.A. Bessa**, G. Catalanotti, M. Vogler, and R. Rolfes. Modeling the inelastic deformation and fracture of polymer composites – part ii: Smeared crack model. *Mechanics of Materials*, 59(0):36 – 49, 2013.

BOOK CHAPTERS:

- J.S. Chen, W.K. Liu, M.C. Hillman, S.W. Chi, Y. Lian, and **M.A. Bessa**. Reproducing Kernel Approximation and Discretization. *Encyclopedia of Computational Mechanics, Second Edition* [Erwin Stein, René de Borst, and Thomas J. R. Hughes Eds.], John Wiley & Sons, Ltd., Chapter 20, pp. 1–41, 2017.

- Z. Dai, **M.A. Bessa**, Shaofan Li, and Wing Kam Liu. Particle method modeling of nonlocal multiresolution continua. In Michael Griebel and Marc Alexander Schweitzer, editors, *Meshfree Methods for Partial Differential Equations VII*, volume 100 of *Lecture Notes in Computational Science and Engineering*, pages 43–60. Springer International Publishing, 2015.

BOOKS:

- **M.A. Bessa**, K.I. Elkhodary, W.K. Liu, T. Belytschko, and B. Moran. *Nonlinear Finite Elements for Continua and Structures: Solution Manual.* Wiley, 2013.

July 28, 2019