# CURRICULUM VITAE

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EDUCATION:

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

AWARDS & HONORS:

**Research awards**:

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| 2011-2016 | **FULBRIGHT Scholarship for Ph.D**. |
| 2013-2015 | **FCT Ph.D Grant**. Portuguese Foundation for Science and Technology fellowship towards the completion of the Ph.D degree. |
| 2012-2013 | **Ted Belytschko's Walter P. Murphy fellowship**. Professor Ted Belytschko is entitled to attribute a Walter P. Murphy fellowship to one Northwestern graduate student. |
| 2012 | **PS&ED fellowship**. Predictive Science & Engineering Design fellowship is awarded on a competitive basis to Ph.D students with deep interest in the interdisciplinary issues across the boundary of "predictive science" and "engineering design". |
| 2010-2011 | **FCT Research Grant**. Research grant attributed by the Portuguese Foundation for Science and Technology for researchers with a M.S. degree. |
| 2010 | **FCT M.S. Grant**. Grant attributed by the Portuguese Foundation for Science and Technology towards the completion of the M.S. degree. |

**Teaching awards**:

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| 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). |

**University of Porto awards**:

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| 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**.

PROFESSIONAL EXPERIENCE:

2010-2011 **Researcher at University of Porto**. Research sponsored by the Portuguese Foundation for Science and Technology. Two research projects for **Airbus** and **NASA**.

TEACHING EXPERIENCE:

As **Instructor**:

Winter 2013 **Advanced Finite Elements I** (ME/CEE-426-1). Graduate level course in Mechanical and Civil Engineering at Northwestern University. Taught 5 weeks of the total 10 weeks, supervised by Professor Ted Belytschko. Students evaluation of teaching performance (CTEC report): **5.775 out of 6.0**.

2011 **Technical Drawing**. Undergraduate level course in Mechanical Engineering (freshman year) at University of Porto. Students evaluation of teaching performance: **A** – grade attributed to 10% of the instructors with the best student evaluation in the entire school of engineering during that academic year.

As **Teaching Assistant**:

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

Spring 2013 **Advanced Finite Elements II** (ME/CEE-426-2). Graduate level course in Mechanical and Civil Engineering at Northwestern University. Instructor: Professor Wing Kam Liu.

As **Monitor**:

2008-2009 "Projecto FEUP". Research tutorials to 1$^{st}$ year students at University of Porto.

ASSOCIATIONS:

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

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

CONFERENCE PRESENTATIONS & INVITED TALKS:

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 Professor Ted Belytschko. Advances in Computational Mechanics (ACM 2013) – A Conference Celebrating the 70th Birthday of Thomas J.R. Hughes, San Diego, CA, USA.

PEER-REVIEW ACTIVITIES:

Referee for 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

JOURNAL PUBLICATIONS: [Selected publications in blue]

[1] **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.

[2] 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. *Accepted in Composites Part A*, 2017.

[3] 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.

[4] 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.

[5] 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.

[6] 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.

[7] 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.

[8] 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.

[9] 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.

[10] **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.

[11] 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.

**April 21, 2017**