

Date of the CVA

21/12/2020

Section A. PERSONAL DATA

Name and Surname	Michael Barton		
DNI/NIE/Passport		Age	
Researcher's identification number	Researcher ID		
	Scopus Author ID	35268171600	
	ORCID	0000-0002-1843-251X	

* Obligatorio

A.1. Current professional situation

Institution	ASOC BCAM - BASQUE CENTER FOR APPLIED MATHEMATICS		
Dpt. / Centre			
Address			
Phone		Email	
Professional category	Ikerbasque Research Associate	Start date	2020
Keywords			

A.2. Academic education (Degrees, institutions, dates)

Bachelor/Master/PhD	University	Year
PhD., Applied Mathematics	Charles University in Prague	2007
Master of Science	Charles University in Prague	2002

A.3. General quality indicators of scientific production

Documents: 48, Citations: 628, h-index: 16 (source Scopus)

Documents: 53, Citations: 773, h-index: 17 (source Google Scholar)

Section B. SUMMARY OF THE CURRICULUM

Academic Experience:

- * [01/2020 - to date] Ikerbasque Research Associate, BCAM, Spain
- * [01/2019 - to date] Ramon y Cajal Fellow, BCAM, Spain
- * [03/2016 - 12/2018] BCAM Researcher, Basque Center for Applied Mathematics, Spain
- * [10/2013 - 02/2016] Research Scientist, Math & CS Dept., KAUST, Saudi Arabia
- * [10/2010 - 09/2013] Senior Postdoc Research Fellow, GMSV Center, KAUST, Saudi Arabia
- * [12/2007 - 09/2010] Postdoc Researcher, Comp. Sci. Dept., Technion, Haifa, Israel
- * [03/2007 - 11/2007] Postdoc Researcher, Institute of Applied Geometry, JKU, Linz, Austria
- * [10/2006 - 02/2007] Assistant Lecturer, Mech. Eng. Dept., CVUT, Prague, Czech Republic
- * [10/2005 - 09/2006] Pre-doctoral Research Fellow, RICAM, Linz, Austria

Research Grants:

- * Design, Analysis, And Manufacturing using Microstructures - ADAM², grant nr. 862025)
PI and Project Coordinator: M. Barton, Horizon 2020 (FETOPEN),
Time Range: 01/2020 - 12/2023, Money Awarded: EUR 3M (to my name: EUR 356K)
- * Ramon y Cajal 2017, Efficient manufacturing of curved objects (RYC-2017-22649)
PI: M. Barton, Time Range: 01/2019 - 12/2023, Money Awarded: EUR 208K
- * Bizkaia Talent Fellowship, Advances in Free-form Shape Manufacturing (AYD-000-270)
PI: M. Barton, Time Range: 10/2015 - 07/2016, Money Awarded: EUR 32.5K
- * Numerical manufacturing of complex surfaces (NSFC, grant nr. 61672187)
Team member, PI: P. Bo, Time Range: 01/2016 - 12/2020, Money Awarded: EUR 80K
- * IMAGEARTH (MTM2016-76329-R)
Team member, PI: D. Pardo, Time Range: 10/2016 - 09/2018, Money Awarded: EUR 75.1K

Awards:

- * Young Investigator Award, Solid Modeling Association, Vancouver, Canada 2019.
- * Precise gouging-free tool orientations for 5-axis CNC machining, Best paper award, 2nd place, SPM, Hong Kong, 2014.
- * Solving well-constrained transcendental systems using expression trees via a single solution test, Best graduate student paper, Technion, 2010, guided student M. Aizenshtein.

Reviewer and Editorial Duties:

- * Associate Editor, Computer Graphics Forum (CGF), Wiley
- * Associate Editor, Computer-Aided Design (CAD), Elsevier
- * Associate Editor, Graphical Models (GMOD), Elsevier
- * Program Chair, SPM 2020
- * Program Committee, GMP 2017-2019, SGP 2017, 2019 SPM 2017-2019
- * Reviewer, I regularly review for Journal of Computational and Applied Mathematics (JCAM), Computer-Aided Design (CAD), and Computer-Aided Geometric Design (CAGD). Altogether, I have reviewed more than 180 journal and conference papers.

Additional Research Activities:

- * [2018 - 2020] External consultant, Algorithm development, Lantek, Spain
- * [2014 - 2018] External consultant, 5-axis CNC machining, ModuleWorks GmbH, Germany
- * [2010 - 2013] External collaborator, GEMS, (ERC grant agreement 286426)
- * [2010 - 2013] External collaborator, Evolute GmbH, Austria
- * [2007 - 2010] Software developer, Solid modeling software IRIT, Israel

Memberships:

- * [02/2019 - to date] Society for Industrial and Applied Mathematics - SIAM
- * [11/2014 - 11/2015] ACM SIGGRAPH
- * [09/2007 - 12/2011] Society for Industrial and Applied Mathematics - SIAM

Selected Invited Presentations and Visits:

- * [March 8 - 10, 2019] Keynote speaker, 14th NFN meeting, Strobl, Austria
- * [February 28 - March 13, 2019] invited research visit, KAUST, Saudi Arabia
- * [November 6 - 11, 2018] invited research visit, University of Florence, Italy

Section C. MOST RELEVANT MERITS (ordered by typology)

C.1. Publications

AC: Autor de correspondencia; (nº x / nº y): posición firma solicitante / total autores

- 1 **Scientific paper**. 2021. Manufacturing of Screw Rotors Via 5-axis Double-Flank CNC Machining Computer-Aided Design. Elsevier. 132.
- 2 **Scientific paper**. 2021. The Construction of Conforming-to-shape Truss Lattice Structures via 3D Sphere Packing Computer-Aided Design. Elsevier. 132.
- 3 **Scientific paper**. 2020. 5-axis double-flank CNC machining of spiral bevel gears via custom-shaped milling tools — Part I: Modeling and simulation Precision Engineering. Elsevier. 62.
- 4 **Scientific paper**. 2020. Characterizing envelopes of moving rotational cones and applications in CNC machining Computer Aided Geometric Design. Elsevier. 83.
- 5 **Scientific paper**. 2020. Efficient mass and stiffness matrix assembly via weighted Gaussian quadrature rules for B-splines Journal of Computational and Applied Mathematics. Elsevier. 371.
- 6 **Scientific paper**. 2020. Reparameterization of Ruled Surfaces: Toward Generating Smooth Jerk-minimized Toolpaths for Multi-axis Flank CNC Milling Computer-Aided Design. Elsevier. 127.

- 7 **Scientific paper.** 2019. Accessibility for Line-Cutting in Freeform Surfaces Computer-Aided Design. Elsevier.
- 8 **Scientific paper.** 2019. Gaussian quadrature for C1 cubic Clough–Tocher macro-triangles Journal of Computational and Applied Mathematics.
- 9 **Scientific paper.** Michael Barton; Pengbo Bo. 2019. On initialization of milling paths for 5-axis flank CNC machining of free-form surfaces with general milling tools Computer Aided Geometric Design. Elsevier. 71, pp.30-42.
- 10 **Scientific paper.** 2019. On numerical quadrature for C1 quadratic Powell–Sabin 6-split macro-triangles Journal of Computational and Applied Mathematics.
- 11 **Scientific paper.** 2018. Dispersion-minimizing quadrature rules for C1 quadratic isogeometric analysis Computer Methods in Applied Mechanics and Engineering.
- 12 **Scientific paper.** 2018. Efficient quadrature rules for subdivision surfaces in isogeometric analysis Computer Methods in Applied Mechanics and Engineering.
- 13 **Scientific paper.** 2018. Highly accurate 5-axis flank CNC machining with conical tools International Journal of Advanced Manufacturing Technology.
- 14 **Scientific paper.** 2017. Automatic fitting of conical envelopes to free-form surfaces for flank CNC machining CAD Computer Aided Design.
- 15 **Scientific paper.** M. Barton; R. Ait-Haddou; V.M. Calo. 2017. Gaussian quadrature for C^1 quintic splines with uniform knot vectors Journal of Computational and Applied Mathematics. Elsevier. 322, pp.57-70.
- 16 **Scientific paper.** Barton, Michael; Calo, Victor M. 2017. Gauss–Galerkin quadrature rules for quadratic and cubic spline spaces and their application to isogeometric analysis Computer-Aided Design. 82, pp.56-67.
- 17 **Scientific paper.** Barton, Michael; Kosinka, Jin. 2017. Towards optimal advection using stretch-maximizing stream surfaces Computer Aided Geometric Design. 79, pp.3-12.
- 18 **Scientific paper.** R. Ait-Haddou; Barton, Michael. 2016. Constrained multi-degree reduction with respect to Jacobi norms Computer Aided Geometric Design. 42, pp.23-30.
- 19 **Scientific paper.** Kosinka, Jiří; Barton, Michael. 2016. Convergence of barycentric coordinates to barycentric kernels Computer Aided Geometric Design. 43, pp.200-210.
- 20 **Scientific paper.** Barton, Michael; Calo, Victor M. 2016. Gaussian quadrature for splines via homotopy continuation: Rules for C2 cubic splines Journal of Computational and Applied Mathematics. 296, pp.709-723.
- 21 **Scientific paper.** Barton, Michael; Calo, Victor M. 2016. Optimal quadrature rules for odd-degree spline spaces and their application to tensor-product-based isogeometric analysis Computer Methods in Applied Mechanics and Engineering. 305, pp.217-240.
- 22 **Scientific paper.** Pengbo Bo; Michael Barton; Denys Plakhotnik; Helmut Pottmann. 2016. Towards efficient 5-axis flank CNC machining of free-form surfaces via fitting envelopes of surfaces of revolution Computer Aided Design. 79, pp.1-11.
- 23 **Scientific paper.** Ait-Haddou, Rachid; Barton, Michael. 2015. Constrained multi-degree reduction with respect to Jacobi norms Computer Aided Geometric Design. 42, pp.23-30.
- 24 **Scientific paper.** Ait-Haddou, Rachid; Barton, Michael; Calo, Victor M. 2015. Explicit Gaussian quadrature rules for C^1 cubic splines with symmetrically stretched knot sequence Journal of Computational and Applied Mathematics. 290, pp.543-552.
- 25 **Scientific paper.** Barton, Michael; Kosinka, Jin; Calo, Victor M. 2015. Stretch-minimising stream surfaces Graphical Models. 79, pp.12-22.
- 26 **Scientific paper.** Kosinka, J.; Barto?, M. 2014. Convergence of Wachspress coordinates: from polygons to curved domains Advances in Computational Mathematics. 41-3, pp.489-505.
- 27 **Scientific paper.** Barton, Michael; Pottmann, Helmut; Wallner, Johannes. 2014. Detection and reconstruction of freeform sweeps Computer Graphics Forum. 33-2, pp.23-32.
- 28 **Scientific paper.** Peng, C.-H.; Barton, M.; Jiang, C.; Wonka, P. 2014. Exploring quadrangulations ACM Transactions on Graphics. 33-1, pp.article nr. a12.
- 29 **Scientific paper.** Kim, Yong-Joon; Elber, Gershon; Barton, Michael; Pottmann, Helmut. 2014. Precise gouging-free tool orientations for 5-axis CNC machining Computer-Aided Design. 58, pp.220-229.

- 30 **Scientific paper.** Barton, Michael; Shi, Ling; Kilian, Martin; Wallner, Johannes; Pottmann, Helmut. 2013. Circular arc snakes and kinematic surface generation Computer Graphics Forum. 32, pp.1-10.
- 31 **Scientific paper.** Aizenshtein, M.; Barto?, M.; Elber, G.2012. Global solutions of well-constrained transcendental systems using expression trees and a single solution test Computer Aided Geometric Design. 29-5, pp.265-279.
- 32 **Scientific paper.** Barton, Michael. 2011. Solving polynomial systems using no-root elimination blending schemes Computer-Aided Design. 43-12, pp.1870-1878.
- 33 **Scientific paper.** Barto?, M.; Elber, G.2011. Spiral fat arcs - Bounding regions with cubic convergence Graphical Models. 73-2, pp.50-57.
- 34 **Scientific paper.** Barto?, M.; Elber, G.; Hanniel, I.2011. Topologically guaranteed univariate solutions of underconstrained polynomial systems via no-loop and single-component tests CAD Computer Aided Design. 43-8, pp.1035-1044.
- 35 **Scientific paper.** Barto?, M.; Hanniel, I.; Elber, G.; Kim, M.-S.2010. Precise Hausdorff distance computation between polygonal meshes Computer Aided Geometric Design. 27-8, pp.580-591.
- 36 **Scientific paper.** Barto?, M.; Jüttler, B.2007. Computing roots of polynomials by quadratic clipping Computer Aided Geometric Design. 24-3, pp.125-141.
- 37 **Book chapter.** 2018. Generalization of the Pythagorean Eigenvalue Error Theorem and Its Application to Isogeometric Analysis SEMA SIMAI Springer Series.
- 38 **Editorial.** 2020. SPM 2020 Editorial Computer-Aided Design. Elsevier. 127.

C.2. Participation in R&D and Innovation projects

- 1 Ramon & Cajal 2017, RYC-2017-22649 (ASOC BCAM - BASQUE CENTER FOR APPLIED MATHEMATICS). 14/01/2019-13/01/2024. 240.000 €.
- 2 ADAM^2, H2020-FETOPEN, gr. nr. 862025 (ASOC BCAM - BASQUE CENTER FOR APPLIED MATHEMATICS). 01/01/2020-31/12/2023. 2.999.903 €.
- 3 MACROPISTAS, PID2019-104488RB-I00 (ASOC BCAM - BASQUE CENTER FOR APPLIED MATHEMATICS). 01/06/2020-31/05/2023. 90.750 €.
- 4 COPTER, KK-2020/00102 (ASOC BCAM - BASQUE CENTER FOR APPLIED MATHEMATICS). 01/03/2020-31/12/2021. 70.217 €.
- 5 Numerical manufacturing of complex surfaces, NSFC, Grant nr. 61672187 Pengbo Bo. (Harbin University). 01/01/2016-30/12/2020. 80.000 €.
- 6 IMAGEARTH David Pardo. (ASOC BCAM - BASQUE CENTER FOR APPLIED MATHEMATICS). 30/12/2016-29/12/2019. 75.100 €.
- 7 Bizkaia Talent Fellowship, Grant nr. AYD-000-270 (ASOC BCAM - BASQUE CENTER FOR APPLIED MATHEMATICS). 01/03/2016-28/02/2017. 32.500 €.
- 8 Solutions of Algebraic and transcendental Systems Lady Davis Research Fellowship. (Technion -- Israel Institute of Technology). 01/09/2008-30/08/2009. 22.000 €.

C.3. Participation in R&D and Innovation contracts

- 1 2D and 3D packing with curved geometries (externally funded PhD student) LANTEK INVESTIGACIÓN Y DESARROLLO, S.L.. 01/09/2019-01/09/2023. 164.000 €.
- 2 BCAM – KAUST Postdoctoral Fellowship in Computational Mathematics (externally funded by PostDoc) KAUST - King Abdullah University of Science and Technology. 01/06/2019-01/06/2020. 41.000 €.
- 3 Multi-axis CNC machining of free-form shapes Marc Stautner. From 15/01/2014. 60.648 €.

C.4. Patents

- 63/021, 163. US provisional patent application 30/05/2020.