MINISTERIO DE CIENCIA E INNOVACIÓN

Cofinanciado por la Unión Europea

AGENCIA ESTATAL DE INVESTIGACIÓN

CURRICULUM VITAE (CVA)

IMPORTANT – The Curriculum Vitae cannot exceed 4 pages. Instructions to fill this document are available in the website.

CV date	13/01/2022

Part A. PERSONAL INFORMATION

First name	Mario Javier		
Family name	Durán Martínez		
Gender	Male	Birth date	[redacted]
ID number	[redacted]		
e-mail	mjduran@uma.es	https://www.researchgate.net/profile/Mj-Duran	
ORCID ID		0000-0002-4912-7091	

A.1. Current position

Position	Full Professor		
Initial date	21/12/2017		
Institution	University of Málaga		
Department/Center	Department of Electrical Engineering		
Country	Spain	Teleph. number	+34 655613177
Key words	Electric drives, multiphase machines, predictive control		

A.2. Previous positions

Period	Position/Institution/Country/Interruption cause
26/02/2008 to 21/12/2017	Associate Professor
14/06/2007 to 25/02/2008	Assisstant Teacher
20/02/2004 to 13/06/2007	Collaborator Teacher
01/11/2001 to 19/02/2004	Research scholarship holder (FPI)

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
PhD (Electrical Engineering)	University of Málaga	2003
MsC (Mechanical Eng.)	University of Málaga	1999

Part B. CV SUMMARY *(last 10 years)*

Following the **DORA** guidelines, the CV of Mario J. Duran can be summarized as follows:

1. Mario J. Duran is currently Full Professor at the University of Málaga in the Department of Electrical Engineering. In the **last ten years**, he has contributed with **66 JCR papers**, including 40 in Q1, 48 in Q1-Q2 and 43 IEEE Transactions. His research activity has generated new valuable knowledge in the field of multiphase electric drives with a high impact in the area (6459 citations, **h-index=43** Google Scholar, h-index=33 WoS).

   Just to put his career in context, he contributed to the first attempt to implement a Model Predictive Control (MPC) in multiphase electric drives in 2008, and received a prestigious Award from IEEE for the Best Paper in the Transactions on Industrial Electronics (3rd in his category).

   After this milestone was reached, subsequent improvements in the proposals led to another Best Paper Award in 2011 at IET Electric Power Applications Journal and a Best Researcher Award from UMA in 2014.

The know-how and the expertise accumulated from 2011 onwards culminated in two special sections about multiphase electric drives (IEEE TIE 2016) and wind energy systems (IET EPA 2017) and some reference texts, including a chapter in the Wiley Encyclopedia of Electrical and Electronics Engineering, two surveys in IEEE Transactions on Industrial Electronics and another one in IET Electric Power Applications. The latter obtained another Best paper Award in 2018.

This intensive research activity has been possible thanks to the funding received from the Spanish government in national projects (DPI2011-25396, ENE2014-52536-C2-1-R y RTI2018-096151-B-I00) and the extensive international activity, with 46 co-authors (36 non-spanish) and 8 research stays in some of the most prestigious institutions (Ryerson University, Liverpool JM University, Imperial College, UTFSM, University of Bologna). The last two research stays were done under Salvador de Madariaga funding with scores of 9.9 and 9.7 out of ten, respectively.

As a result of this activity, he is one of the most cited researchers according to the ranking provided by the University of Stanford. He has also been responsible of the TIC-201 research group (evaluated with 30 out of 32 points by the DEVA Andalusian agency) and principal researcher of three national projects and one regional project.

2. Mario J. Duran has also contributed with the creation of the pioneering laboratory 3507 LII at the School of Engineering in the University of Malaga. Funded in 2011, this lab has been equipped during the last decade including two- and three-level voltage source converters, five- and six- induction machines, grid-connection through a hybrid back-to-back connection and a control system that was designed, built and patented by the group that Mario J. Duran has been leading in the last ten years.

   He has also collaborated with the company EPCOS in 2 OTRI contracts, has evaluated 10 research projects from companies for ACIE and EQA. Additionally, he has provided expert training for members of companies such as Abengoa or Eolia Renovables.

3. During this ten years, Mario J. Duran has also been involved in intensive training activities, lecturing in undergraduate (19) and Master (8) subjects, supervising Bsc and Msc Projects (35) and organizing more than 20 courses on renewable energies, Matlab and Python. He has been director of 5 PhD thesis (with another 3 ongoing), including two female researchers that successfully ended the PhD (Dra. Cristina Martin and Dra. Paula García), and he has also been supervisor of students funded with research projects (7), youth employment program (2), department collaboration (2), OTRI transfer contracts (2) and Juan de la Cierva scholarship (2).

   It is worth highlighting that all PhDs have led to at least three JCR in Q1 and have obtained the maximum mark. Nowadays, Mario J. Duran is the leader of a small but young and productive research group that intensively works in the lab 3507 LII described in point 2.

4. Apart from the numbers, research indices and awards, I would like to highlight that some of the research proposals have been <u>groundbreaking</u>, modifying the existing research trend. For example, the *natural fault tolerance* proposed in the last project (RTI2018-096151-B-I00) demonstrated that multiphase electric drives could be empowered with a fault-tolerant capability without any control reconfiguration (all works before, including mine, required fault identification and some kind of control reconfiguration to obtain a continuous operation). In the same manner, the use of *virtual voltage vectors* in model predictive strategies improved the control performance so much that some of the last multi-vector versions outperform field-oriented control with an explicit modulation stage. This achievement opened a new successful family of multi-vector MPC strategies that is currently drawing much attention.

Part C. RELEVANT MERITS

C.1. Publications (10 out of 66 JCRs in the las ten years)

1) A. Gonzalez-Prieto, I. Gonzalez-Prieto, A. G. Yepes, **M. J. Duran** and J. Doval-Gandoy, "On the Advantages of Symmetrical Over Asymmetrical Multiphase AC Drives with Even Phase Number Using Direct Controllers," in *IEEE Transactions on Industrial Electronics*, doi: 10.1109/TIE.2021.3104588.
2) A. González-Prieto, I. González-Prieto and **M. J. Duran**, "Smart Voltage Vectors for Model Predictive Control of Six-Phase Electric Drives," in *IEEE Transactions on Industrial Electronics*, vol. 68, no. 10, pp. 9024-9035, Oct. 2021, doi: 10.1109/TIE.2020.3028812.
3) I. G. Prieto, **M. J. Duran**, P. Garcia-Entrambasaguas and M. Bermudez, "Field-Oriented Control of Multiphase Drives With Passive Fault Tolerance," in *IEEE Transactions on Industrial Electronics*, vol. 67, no. 9, pp. 7228-7238, Sept. 2020, doi: 10.1109/TIE.2019.2944056.
4) P. Garcia-Entrambasaguas, I. Zoric, I. González-Prieto, **M. J. Duran** and E. Levi, "Direct Torque and Predictive Control Strategies in Nine-Phase Electric Drives Using Virtual Voltage Vectors," in *IEEE Transactions on Power Electronics,* vol. 34, no. 12, pp. 12106-12119, Dec. 2019, doi: 10.1109/TPEL.2019.2907194.
5) J. J. Aciego, I. González Prieto and **M. J. Duran**, "Model Predictive Control of Six-Phase Induction Motor Drives Using Two Virtual Voltage Vectors," in *IEEE Journal of Emerging and Selected Topics in Power Electronics*, vol. 7, no. 1, pp. 321-330, March 2019, doi: 10.1109/JESTPE.2018.2883359.
6) I. Gonzalez-Prieto, **M. J. Duran**, J. J. Aciego, C. Martin and F. Barrero, "Model Predictive Control of Six-Phase Induction Motor Drives Using Virtual Voltage Vectors," in *IEEE Transactions on Industrial Electronics,* vol. 65, no. 1, pp. 27-37, Jan. 2018, doi: 10.1109/TIE.2017.2714126.
7) W. N. W. A. Munim, **M. J. Duran**, H. S. Che, M. Bermúdez, I. González-Prieto and N. A. Rahim, "A Unified Analysis of the Fault Tolerance Capability in Six-Phase Induction Motor Drives," in *IEEE Transactions on Power Electronics*, vol. 32, no. 10, pp. 7824-7836, Oct. 2017, doi: 10.1109/TPEL.2016.2632118.
8) I. González-Prieto, **M. J. Duran**, N. Rios-Garcia, F. Barrero and C. Martín, "Open-Switch Fault Detection in Five-Phase Induction Motor Drives Using Model Predictive Control," in *IEEE Transactions on Industrial Electronics*, vol. 65, no. 4, pp. 3045-3055, April 2018, doi: 10.1109/TIE.2017.2748052.
9) **M. J. Duran**, I. Gonzalez Prieto, M. Bermudez, F. Barrero, H. Guzman and M. R. Arahal, "Optimal Fault-Tolerant Control of Six-Phase Induction Motor Drives With Parallel Converters," in *IEEE Transactions on Industrial Electronics,* vol. 63, no. 1, pp. 629-640, Jan. 2016, doi: 10.1109/TIE.2015.2461516.
10) H. S. Che, **M. J. Duran**, E. Levi, M. Jones, W. Hew and N. A. Rahim, "Postfault Operation of an Asymmetrical Six-Phase Induction Machine With Single and Two Isolated Neutral Points," in *IEEE Transactions on Power Electronics*, vol. 29, no. 10, pp. 5406-5416, Oct. 2014, doi: 10.1109/TPEL.2013.2293195.

C.2. Congress (6 out of more than 100)

1) A. González Prieto, I. González Prieto, A. Gómez Yepes, **M. J. Duran** and J. Doval-Gandoy, “Symmetrical Six-Phase Induction Machines: A Solution for Multiphase Direct Control Strategies,” 22nd IEEE International Conference on Industrial Technology (ICIT2021), Valencia (Spain), 2021.
2) P. Salas-Biedma, I. Gonzalez-Prieto and **M. J. Duran**, "Current Imbalance Detection Method based on Vector Space Decomposition Approach for Five-Phase Induction Motor Drives," IECON 2019 - 45th Annual Conference of the IEEE Industrial Electronics Society, 2019, pp. 975-980, doi: 10.1109/IECON.2019.8927022.

3) A. Gonzalez-Prieto, I. Gonzalez-Prieto and **M. J. Duran**, "Efficient Predictive Control with Natural Fault-Tolerance for Multiphase Induction Machines," IECON 2019 - 45th

Annual Conference of the IEEE Industrial Electronics Society, 2019, pp. 1034-1039, doi: 10.1109/IECON.2019.8927715.

4) J. J. Aciego, I. Gonzalez-Prieto and **M. J. Duran**, "Control of Six-Phase Voltage Source Converters Using Dynamic Voltage Vectors," IECON 2019 - 45th Annual Conference of the IEEE Industrial Electronics Society, 2019, pp. 6200-6205, doi: 10.1109/IECON.2019.8927031.
5) J. J. Aciego, I. Gonzalez-Prieto, **M. J. Duran** and F. Barrero, "Regulation of Six-Phase Induction Motor Drives with Enhanced Virtual Vector Model Predictive Control," 7th International Conference on Advanced Technologies. At: Antalya, Turkey, 2018.
6) N. Rios-Garcia, **M.J. Duran**, Ignacio González-Prieto, C. Martin and F.Barrero, "An Open-phase Fault Detection Method for Six-phase Induction Motor Drives," International Conference on Renewable Energy and Power Quality (ICREPQ'17), Málaga (España), 4-6 Abril, 2017.

C.3. Research projects (6 in the last ten years, PR in 4 of them)

1) Plan nacional I+D+i (Retos). Título: "Incremento de la fiabilidad en sistemas de energia eolica multifasicos mediante el desarrollo de una tolerancia natural al fallo". Referencia: RTI2018-096151-B-I00. Duración: 2019-2021. Importe: 96.000,00 €. Rol: **IP del proyecto.**
2) Proyectos FEDER Junta de Andalucía. Título: "Suministro inteligente de tensión para la propulsión eficiente de vehículos eléctricos" Referencia: UMA20-FEDERJA-039. Duración: 2021-2023. Importe: 22.126 €. Rol: **IP del Proyecto.**
3) Plan nacional I+D+i (Retos). Título: "Desarrollo de sistemas eólicos multifásicos tolerantes a fallos". Referencia: ENE2014-52536-C2-1-R. Duración: 2014-2018. Importe: 129.470,00 €. Rol: **IP del proyecto.**
4) Plan Nacional I+D+i. Título: "Análisis y desarrollo de sistemas multifásicos de conversión de la energía eólica (MWECS)", Referencia: DPI2011-25396. Duración: 2012-2014. Importe: 139.150 €, Rol: **IP del Proyecto.**
5) Proyectos Excelencia Junta de Andalucía. Título: "Movilidad eléctrica en entornos urbanos (MOVELEC)". Referencia: P11-TEP-7555. 2013-2016. Importe: 126.930 €, Rol: Investigador.
6) Proyectos Excelencia Junta de Andalucía. Título: "Aplicación de sistemas de propulsión basados en motores multifásicos al desarrollo de vehículos eléctricos". Referencia: P10-TEP-5791. 2011-2014. Importe: 143.470 €, Rol: Investigador.

C.4. Contracts, technological or transfer merits (2 out of 12 contracts)

1) Contrato con la empresa EPCOS-TDK, titulado "Proyecto técnico para la caracterización eléctrica de condensadores de alta frecuencia para convertidores basados en **semiconductores de SiC**". Importe: 9.213,80 €. Fecha: 2018.
2) Contrato con la empresa EPCOS-TDK, titulado "Proyecto técnico para la liberalizacion de un nuevo interruptor de sobrepresión para condensadores de potencia", Importe: 18253 €. Fecha: 2016.
3) Contrato con la empresa ACIE, titulado "Realizacion de servicio de evaluacion, como especialista y experto tecnico, sobre recarga de vehiculos electricos". Importe: 600 €. Fecha 2013.
4) Patente nacional titulada : "Módulos electrónicos y sistemas electrónicos modulares para monitorización y/o gestión o control de convertidores de potencia". Referencia: ES2558951. Fecha concesión: 08/11/2016 (patente en explotación).