

<b>Part A. PERSONAL INFORMATION</b>		<b>CV date</b>	7/11/2019
First and Family name	Juan Calvo Yagüe		
Social Security, Passport, ID number	78973241G	Age	36
Researcher numbers	Researcher ID	O-5623-2016	
	Orcid code	0000000184598799	

**A.1. Current position**

Name of University/Institution	Universidad de Granada		
Department	Matemática Aplicada		
Address and Country	Campus de Fuentenueva 18071 Granada, España		
Phone number	E-mail	<a href="mailto:juancalvo@ugr.es">juancalvo@ugr.es</a>	
Current position	Contratado reincorporación	From	01/04/2016
Espec. cód. UNESCO	120220		
Palabras clave	kinetic theory, degenerate parabolic equations		

**A.2. Education**

PhD	University	Year
Doctor en Matemáticas	Universidad de Granada	2010

**A.3. JCR articles, h Index, thesis supervised...**

Total number of citations: 131 (WoS), 256 (google scholar)

H-index: 7 (WoS), 9 (google scholar)

Total number of Q1 publications: 16

Average number of citations per year (last five years): 16.4 (WoS), 33.6 (google scholar)

**Part B. CV SUMMARY (max. 3500 characters, including spaces)**

I obtained a PhD from Universidad de Granada in 2010 (branch: Mathematics, advisors: O. Sánchez, J. Soler). Next I had two postdoc contracts at Universidad de Granada and a Juan de la Cierva fellowship at Universitat Pompeu Fabra, joining the team of V. Caselles and C. Ballester. After that I had another postdoc appointment at Centre de Recerca Matemàtica (grupo de biología computacional led by T. Alarcón). As of 2016 I am working at Universidad de Granada under a reincorporation grant.

My main research line is framed in Partial Differential Equation analysis (chiefly equations of parabolic and kinetic type) and their applications to several branches of Mathematical Biology. A recurrent topic in my research career is the inadequacy of standard diffusion equations to the modeling of certain biological problems, due to the fact that propagation speed cannot be controlled within such frameworks. On one hand I published a number of works on degenerate parabolic equations having flux-saturation mechanisms, as a result of several collaborations with F. Andreu, J. Campos, V. Caselles, J. Mazón, O. Sánchez and J. Soler. These models allow to describe interaction propagation speed in an accurate fashion; we have studied both theoretical properties of these models and their application to specific problems in Biomathematics. Furthermore, we opened a new research line on singular traveling waves arising from such degenerate models. On the other hand, I work with Tomás Alarcón to engineer hybrid computational simulation methods combining deterministic and stochastic descriptions, which provide another framework to track propagation speed in an accurate way.

The previous research lines are intertwined with my works about models in Kinetic Theory (kinetic models with coagulation effects, DNA models). I have also worked on kinetic models

from additional perspectives: behavior of collisionless models in Astrophysics, dark matter distribution in spiral galaxies, relativistic gases, hydrodynamic limits. These research lines were developed together with a wide range of interdisciplinary collaborators.

## Part C. RELEVANT MERITS

### C.1. Selected publications (including books)

[1] J. Calvo, M. Doumic, B. Perthame, Long-Time Asymptotics for Polymerization Models. *Communications in Mathematical Physics* 363 (2018), 111-137.

[2] R. de la Cruz, P. Guerrero, J. Calvo, T. Alarcón, Coarse-graining and hybrid methods for efficient simulation of stochastic multi-scale models of tumour growth. *Journal of Computational Physics* 350 (2017), 974-991.

[3] J. Calvo, J. Campos, V. Caselles, O. Sánchez, J. Soler, Qualitative behavior for flux-saturated mechanisms: travelling waves, waiting time and smoothing effects. *Journal of the European Mathematical Society* 19 (2017), 441-472.

[4] J. Calvo, J. Campos, V. Caselles, O. Sánchez, J. Soler, Pattern formation in a flux limited reaction-diffusion equation of porous media type. *Inventiones Mathematicae* 206 (2016), 57-108.

[5] J. Calvo, Analysis of a class of diffusion equations with a saturation mechanism. *SIAM Journal on Mathematical Analysis* 47 (2015), 2917--2951.

[6] J. Calvo, V. Caselles, Local-in-time regularity results for some flux-limited diffusion equations of porous media type. *Nonlinear Analysis TMA* 93 (2013), 236--272.

[7] B. Ruiz-Granados, E. Battaner, J. Calvo, E. Florido, J.A. Rubiño-Martín, Dark matter, magnetic fields and the rotation curve of the Milky Way. *The Astrophysical Journal Letters*, Volume 755, Issue 2, L23, 5pp (2012).

[8] J. Calvo, J.M. Mazón, J. Soler, M. Verbeni, Qualitative properties of the solutions of a nonlinear flux-limited equation arising in the transport of morphogens. *Mathematical Models and Methods in the Applied Sciences* 21 (2011), 893--937.

[9] J. Calvo, P.E. Jabin, Large time asymptotics for a modified coagulation model. *Journal of Differential Equations* 250 (2011), 2807--2837.

[10] S. Calogero, J. Calvo, O. Sánchez, J. Soler, Virial inequalities for steady states in relativistic galactic dynamics. *Nonlinearity* 23 (2010), 1851--1871.

### C.2. Research projects and grants

"Un nuevo método de construcción de modelos de coagulación y sus implicaciones en Ciencias Acuáticas". Ministerio de Ciencia, Innovación y Universidades, programa "Explora Ciencia/Explora tecnología". MTM2017-91054-EXP. PI: Juan Calvo. From 01/11/2018 to 30/10/2020.

"Modelado y análisis matemático de problemas originados en biotecnología, biomedicina y biología del desarrollo". Universidad de Granada/FEDER. PI: Juan Calvo. From 01/04/2016 to 31/03/2021.

"Dinámica evolutiva, teoría cinética y descripciones hidrodinámicas en ciencias de la vida". Ministerio de Economía y Competitividad/FEDER, Proyectos de I+D+I: Retos de investigación. MTM2014-53406-R. PI: Juan Soler. From 01/01/2015 to 31/12/2019. Role: part-time member of the research team.



### **C.3. Contracts**

Contrato de reincorporación, Universidad de Granada (see C.2). PI: Juan Calvo. From 01/04/2016 to 31/03/2021.

Postdoc contract (La Caixa Collaborative Research Programme), Centre de Recerca Matemàtica. PI: Tomás Alarcón. From 01/04/2015 to 31/03/2016.

Juan de la Cierva fellowship, Universitat Pompeu Fabra. PI: Vicent Caselles. From 01/04/2012 to 31/03/2015.

Postdoc contract, Universidad de Granada. PI: Juan Soler. From 15/05/2011 to 31/03/2012.

Contrato Postdoctoral, programa de contratos puente del plan propio de investigación de la Universidad de Granada. PI: Juan Soler. From 01/05/2010 to 30/04/2011.

Contrato y beca predoctoral FPU, Universidad de Granada. PI: Juan Soler. From 01/04/2006 to 31/03/2010.

### **C.5. Scientific events organized**

Miembro del Comité Científico del V congreso de Jóvenes Investigadores de la RSME. Castellón, España, 27-31 de Enero de 2020.

Miembro del comité organizador del workshop "First meeting on Biophysical approaches to exopolymeric particle dynamics in aquatic ecosystems". Universidad de Granada, 26 a 27 de Junio de 2019.

Miembro del comité organizador del congreso internacional "Biomat 2017". Universidad de Granada, 12-14 Junio 2017.

Miembro del comité organizador de la "Summer school on nonlinear pde's and applications to image analysis", Centre de Recerca Matemàtica, Bellaterra, Barcelona, 20-24 Julio 2015.

Miembro del comité organizador del congreso internacional "Biomat 2012. Self-organization and collective dynamics in the life sciences. Swarms, biofilms, traffic", Universidad de Granada, 02-06 Julio 2012.

Miembro del comité organizador del congreso internacional "Biomat 2011. Perspectives in Mathematics and Life Sciences", Universidad de Granada, 06-08 Junio 2011.

### **C.6. Prizes**

Premio Antonio Valle al joven investigador 2016 de la Sociedad Española de Matemática Aplicada.

Early Career Award 2015 of the Mathematical Biosciences Institute, The Ohio State University.

Premio extraordinario de doctorado de la Universidad de Granada para tesis defendidas en el curso 2009-2010 en el área de Ciencias Experimentales.

Mención especial en los premios nacionales fin de carrera 2004-2005.



**C.7. MSc theses mentorship**

Lucía Caridad Varela, Master Fisymat. Modelo estocástico para las etapas iniciales del proceso de polimerización en enfermedades neurodegenerativas. Notable (8). Term 2016/2017.

Silvia Pagliarini (co-mentored with Andrei Korobeinikov), Master in Mathematics (University of Verona). Mathematical modelling of marine bacteriophages evolution. Sobresaliente. Term 2015/2016.

Jorge Martos (co-mentored with Beatriz Ruiz-Granados), Master Fisymat. Modelos de materia oscura en galaxias. Notable. Term 2014/2015.

David Garrido Reyes (co-mentored with Óscar Sánchez Romero), Master Fisymat. Modelo de las dinámicas acopladas de Decapentaplegic y Hedhehog en Drosophila Melanogaster. Sobresaliente. Term 2013/2014.