MINISTERIO DE CIENCIA E INNOVACIÓN

Cofinanciado por la Unión Europea

AGENCIA ESTATAL DE INVESTIGACIÓN

CURRICULUM VITAE ABREVIADO (CVA)

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

Part A. PERSONAL INFORMATION

First name	Francisco		
Family name	Guillén González		
Gender (*)		Birth date (dd/mm/yyyy)	
Passport, ID number			
e-mail		URL Web	
Open Researcher ID (ORCID) (*) 0000-0001-5539-5888			

(*) Mandatory

A.1. Current position

Position	Full professor		
Initial date	10/02/2009		
Institution	Universidad de Sevilla		
Department/Center			
Country	Spain	Teleph. number	
Key words	Partial Differential Equations, Fluids mechanics, Phase-field interface models, Biological models, Optimal control		

A.2. Previous positions (research activity interuptions, indicate total months)

Period	Position/Institution/Country/Interruption cause
1988-1994	Assistant profesor/Universidad de Sevilla/Spain/promotion
1995-2008	Associate Professor/ Universidad de Sevilla/Spain/promotion

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
M.S. Mathematics	Universidad de Sevilla	1988
PhD Mathematics	Universidad de Sevilla	1992

Part B. CV SUMMARY *(max. 5000 characters, including spaces)*

- Principal Researcher of 7 research grants
- 7 quinquenios docencia (five-year-docent periods): from 15-11-1988 to 14-11-2023.
- Publications: 103 (WoS, since 2001), 111 (Scopus, since 2000), 133 (MathSciNet), 116 (JCR)
- 5 sexenios de investigación (six-year-research periods): 92/97; 98/03; 04/09; 10/15; 16/21
- Advisor of 4 PhD theses in the last 5 years (and 12 in total).
- Citations: 1421 (WoS), 1538 (Scopus, since 2003), 1529 (MathSciNet),
- Averaged citations: 13,80 (WoS), 13,86 (Scopus)
- h index: 20 (WoS), 21 (Scopus).
- Referee for more than 50 scientific international journals.

* Associate Editor of SEMA Journal.

My scientific research started in the 90's with the mathematical analysis of partial differential equations (PDEs) systems modeling fluids: Navier-Stokes, density-dependent fluids, non-Newtonian fluids (with memory effects), Oceanography, liquid crystals, etc. The task was to prove qualitative properties of the PDEs systems such as, existence, uniqueness, regularity, periodicity, continuous dependence, behavior at infinite time, etc.
In the 2000s, the numerical analysis via Finite Elements of PDEs is also considered, designing efficient numerical schemes, and looking for optimal stability, convergence, error estimates, etc. These results are complemented by numerical simulations using computing codes, which allow a complete study of problems: mathematical and numerical analysis and scientific programming.

In the 2010s I have studied phase field models (with diffuse interface) widely used for modeling phase transitions (solid, liquid, gas and intermediate phases), and for the theory of mixtures or multi-components (immiscible fluids). Since these problems have very different properties like conservation, pointwise estimates, Lyapunov energy functional, the design of property-preserving and efficient numerical schemes was a very challenge problem. Then, in my research I am developing other numerical methods moreover of FE, as Finite Volume and Discontinuos Galerkin.

In the last 10 years, my scientific objective has been to study (analytical and numerically) ODE and PDE systems modeling biological processes as chemotaxis, growth-death reactions terms and related optimal control problems. Recently, I have incorporated research in modelization of biological processes including nonlocal effects, arriving at differential-integral equations.

Part C. RELEVANT MERITS *(sorted by typology)*

C.1. Publications *(since 2020)*

1. Acosta, D.; Guillén-González, F.; Rodríguez-Galván, J.R; Wang, J; Property-preserving numerical approximation of a Cahn–Hilliard–Navier–Stokes model with variable density and degenerate mobility. Appl. Numer. Math. 209 (2025) 68-83.
2. Guillén-González, F.; Tierra, G.; Structure preserving finite element schemes for the Navier-Stokes-Cahn-Hilliard system with degenerate mobility. Computers and Mathematics with Applications, 172 (2024) 181-201.
3. Corrêa Vianna Filho, André Luiz; Guillén-González, Francisco; Optimal control related to weak solutions of a chemotaxis-consumption model. Applied Mathematics and Optimization (2024) 89:98.
4. Guillén-González, F.; Tierra, G.; Finite Element numerical schemes for a chemoattraction and consumption model. Journal of Computational and Applied Mathematics 441 (2024).
5. Guillén-González, F.; Tierra, G.; Energy-stable and boundedness preserving numerical schemes for the Cahn-Hilliard equation with degenerate mobility. Appl. Numer. Math. 196 (2024) 62-82.
6. Acosta, D.; Guillén-González, F.; Rodríguez-Galván, J.R; A structure-preserving upwind DG scheme for a degenerate phase-field tumor model. Computers and Mathematics with Applications, 152 (2023) 317-333.
7. Guillén-González, F.; Sevillano-Castellano E.; Suárez A; Fitting parameters and therapies of ODE tumor models with senescence and immune system. Journal of Mathematical Biology (2023) 87:67.
8. Acosta, D.; Guillén-González, F.; Rodríguez-Galván, J.R; An unconditionally energy stable and positive upwind DG scheme for the Keller-Segel model. Journal of Scientific Computing, (2023) 97:18.

9. Corrêa Vianna Filho, André Luiz; Guillén-González, Francisco; An Optimal Control Problem Subject to Strong Solutions of Chemotaxis-Consumption Models. SICON, Vol. 61, No. 5 (2023), pp. 3156-3182.
10. Corrêa Vianna Filho, André Luiz; Guillén-González, Francisco; Convergence of a Time Discrete Scheme for a Chemotaxis-Consumption Model. SINUM. Vol. 61, No. 5 (2023), 2509-2533.
11. Braz e Silva, P.; Guillén-González, F.; Perusato, *C.F.;* Rodríguez-Bellido, M.A.; Bilinear optimal control of the Keller-Segel logistic model in 2D-domains. Applied Mathematics and Optimization, Vol. 87, No. 3, 55-1 55-20 (2023)
12. Acosta, D.; Guillén-González, F.; Rodríguez-Galván, J.R; An upwind DG scheme preserving the maximum principle for the convective Cahn-Hilliard model. Numerical Algorithms, 92:1589–1619 (2023)
13. Corrêa Vianna Filho, André Luiz; Guillén-González, Francisco; Uniform in time solutions for a chemotaxis with potential consumption model. Nonlinear Anal. Real World Appl. 70 (2023), Paper No. 103795, 39 pp.
14. Climent-Ezquerra, Blanca; Guillén-González, Francisco Long-time behavior of global weak solutions for a Beris-Edwards type model of nematic liquid crystals. *J. Math. Fluid Mech.* 24 (2022), no. 4, Paper No. 106, 12 pp.
15. Fernández-Romero, A.; Guillén-González, F.; Suárez A. A Glioblastoma PDE-ODE model including chemotaxis and vasculature. ESAIM: Mathematical Modelling and Numerical Analysis. Vol. 56, No. 2, pp. 407-431. (2022).
16. Guillén-González, F.; Rodríguez-Bellido, M. A.; Rueda-Gómez, D. A. Comparison of two finite element schemes for a chemo-repulsion system with quadratic production. Applied Numerical Mathematics. 173, pp. 193 - 210. (2022).
17. Guillén-González, F; Rodríguez-Bellido, M.A; Rueda-Gómez, D.A. A chemorepulsion model with superlinear production: analysis of the continuous problem and two approximately positive and energy-stable schemes. Adv Comput Math (2021) 47-87.
18. Guillén-González, F.; Rodríguez-Bellido, M.A.; Tierra, G. Fluid vesicles with internal nematic order. Physica D-Nonlinear Phenomena, 415 (2021).
19. Fernández-Romero, A.; Guillén-González, F.; Suárez A. Theoretical and numerical analysis for a hybrid tumor model with diffusion depending on vasculature. J. Math. Anal. Appl. (JMAA) (2021) Vol. 503, No. 2.
20. Guillén-González, F.; Redondo-Neble, V.; Rodríguez-Galván, J.R; Numerical analysis of a stable discontinuous galerkin scheme for the hydrostatic stokes problem. J. Num. Math. 29 - 2, pp. 103-118. (2021).
21. Fernández-Romero, A.; Guillén-González, F.; Suárez A. Theoretical analysis for a PDE-ODE system related to a glioblastoma tumor with vasculature. ZAMP, 72-3 (2021).
22. Guillén-González, F.; Calsavara, Bianca M. Existence of global in time weak solutions for a solidification model with convection in the liquid and rigid motion in the solid. SIAM J. MATH. ANAL., Vol. 52, No. 6, (2020) 6260-6280.
23. Guillén-González, F.; Rodríguez-Bellido, M.A.; Tierra, G. Nematic order on a deformable vesicle with anchoring effects. Results in Applied Mathematics (2590-0374), 8 (2020) 100102.
24. Guillén-González, F.; Mallea-Zepeda, E.; Villamizar-Roa, E.J. On a Bi-dimensional chemo-repulsion model with nonlinear production and a related optimal control problem. Acta Applicandae Mathematicae, Vol.170, No.1, 963–979.
25. Guillén-González, F.; Mallea-Zepeda, E.; Rodríguez-Bellido, M.A. (2020). A Regularity Criterion for a 3D Chemo-Repulsion System and Its Application to a Bilinear Optimal Control Problem. SIAM J. Control and Optimization, 58, no. 3 (2020), 1457-1490.
26. Guillén-González, F.; Rodríguez-Bellido, M.A.; Rueda-Gómez, D. (2020). Study of a chemo-repulsion model with quadratic production. Part I: Analysis of the continuous problem and time-discrete numerical schemes. Comp. And Math. With Appl., 80 (2020) 692-713.

27. Guillén-González, F.; Rodríguez-Bellido, M.A.; Rueda-Gómez, D. (2020). Study of a chemo-repulsion model with quadratic production. Part II: Analysis of an unconditionally energy-stable fully discrete scheme. Comp. And Math. With Appl., 80 (2020) 636–652.
28. Guillén-González, F.; Mallea-Zepeda, E.; Rodríguez-Bellido, M.A. (2020). Optimal bilinear control problem related to a chemo-repulsion system in 2D domains. ESAIM-Control Optim. Calc. Variat., 26 (2020) 29.

C.2. Congress, indicating the modality of their participation (invited conference, oral presentation, poster)

1. Invited speaker in the congress: V Workshop de Matemáticas Aplicadas. *"Some thoughts on PDE constrained Optimal control problems, Arica, Chile, del 29 al 30 de julio de 2024.*
2. Speaker of the lecture "By approximating Chemotaxis PDE systems from different perspectives". *Arica, Chile, del 31 de julio al 02 de agosto de 2024.*
3. Speaker of the lecture "Optimal control problems related to chemotaxis PDEs". Minisymposia at 9th ECM 2024 congress: "Analysis, approximation and control of chemotaxis models". Sevilla, July 2024.
4. Speaker of the lecture: "Some chemotaxis PDE-constrained optimal control problems. Analysis and approximation". 21 French-German-Spanish conference on optimization. Gijón, from June 18 to 21, 2024.
5. Invited speaker in the congress: Ulysseus Spring School in PDEs, June 12-16, 2023

C.3. Research projects, indicating your personal contribution. In the case of young researchers, indicate lines of research for which they have been responsible.

1. Reference: **PID2023-149182NB-I00**. Title: **New mathematical challenges in local and nonlocal PDE biological models**. Funded by: **MICIU/AEI/10.13039/501100011033 and, ERDF/EU**. Date: **01/09/2024-31/08/2028.** Funding: **75.000€**. Participation: **Principal Investigator.**

2. Reference: **IEA 2023** (**IEA-International Emerging Actions**). Title: **Study of optimal control for degenerate chemotaxis problems**. Funded by: **Projet de coopération Impression CNRS, Francia**. Date: **01/01/2024-31/12/2025.** Funding**: 4000€.** Participation: **Principal Investigator.**

3. Reference: **P20_01120**. Title: **New challenges in the study of biological processes using partial differential equations**. Funded by: ***Consejería de Transformación Económica, Industria, Conocimiento y Universidades. JJAA* (PAIDI 2020).** Date: **01/01/2021-31/05/2023.** Funding: **23.880,00€.** Participation: **Principal Investigator.**

4. Reference: **US-1381261**. Title: **Different perspectives for biomathematical models: modeling, analysis and approximation**. Funded by: **Consejería de Universidad, Investigación e Innovación. JJAA y Feder**. Date: **01/01/2021-31/05/2023.** Funding: **75.500,00€.** Participation: **Investigator.**

5. Reference: **IEA 2019** (**IEA-International Emerging Actions**). Title: **High Order Positive schemes for the Keller-Segel Problem**. Funded by: **Projet de coopération Impression CNRS, Francia**. Date: **01/01/2020-31/12/2021.** Participation: **Principal Investigator.**

6. Reference: **PGC2018-098308-B-I00.** Title: **PDEs for Biological models with Chemotaxis and Nonlocal effects.** Funded by: **Ministerio de Economia y Competitividad + FEDER, Spain**. Date: **01/01/2019-31/05/2023**. Funding: **77.682 euros**. Participation: **Principal Investigator**.

7. Reference: **MTM2015-69875-P**. Title: **Diffusion, reaction and phase field problems applied to living organisms**. Funded by: **Ministerio de Economia y Competitividad + FEDER, Spain**. Date: **01/01/2016-31/07/2019**. Funding: **68.000 euros**. Participation: **Principal Investigator**.