CURRICULUM VITAE (CVA)

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CV date	09/12/2021

Part A. PERSONAL INFORMATION

First name	Inmaculada Concepción		
Family name	Baldomá	Barraca	
Gender (*)	Female	Birth date (dd/mm/yyyy)	12/02/1971
ID number	384548985E		
e-mail	immaculada.baldoma@upc.edu	https://mat.upc.edu/en/people/immaculada.baldoma	
Open Researcher and Contributor ID (ORCID) (*)	0000-0002-4838-1186		

(*) Mandatory

A.1. Current position

Position	Profesora Titular de Universidad (Associate Professor)	
Initial date	11/06/2008	
Institution	Universitat Politècnica de Catalunya (UPC)	
Department/Center	Departament de Matemàtiques	https://mat.upc.edu/ca
Country	Spain	Teleph. number 934017077
Key words	Dynamical Systems, global analysis, asymptotic methods, invariant manifolds.	

A.2. Previous positions (research activity interuptions, art. 14.2.b))

Period	Position/Institution/Country/Interruption cause
01/02/2007-10/06//2008	Profesora Lector, Universitat Politècnica de Catalunya
10/10/2005-31/01/2007	Profesora Lector, Universitat Rovira i Virgili
16/02/2004-09/10/2005	Profesora Lector, Universitat de Barcelona
1/10/1996-15/02/2004	Profesora Ayudante, Universitat de Barcelona
13/10/1994-30/11-1996	Profesora Asociada, Universitat de Barcelona

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
PhD in Mathematics	Universitat de Barcelona	2001
Bachelor's Degree in Mathematics	Universitat de Barcelona	1994

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

Since 2008 I am Associate Professor at the Mathematics Dept. of UPC. I am the Director of Research of the department (about 200 members) and I am the Academic Secretary of the Catalan Mathematical Society (SCM). I am member of Centre Recerca Matemàtica (Maria de Maeztu Award)) and of IMTech-UPC.

My expertise relies in a thorough knowledge of functional and complex analysis tools and how to apply them to different problems in dynamical systems as existence and regularity of invariant manifolds, exponentially small phenomena, matched asymptotic expansions and more recently in Arnold diffusion and chaotic behavior in the 3-body problem with my PhDstudents.

I have led the research about the existence and regularity of invariant manifolds associated to parabolic invariant objects, filling the gap where classical hyperbolic theory cannot be applied. In my papers [1,2,3] and (DCDS, 2017), that rely on the parameterization method, I propose an original way to solve the cohomological equations (that are linear partial equations) by means of suitable (and explicit) homogeneous functions. Moreover I provide computable conditions to guarantee the existence and regularity of stable invariant manifolds to parabolic tori, a plethora of examples and the existence of parabolic motions to infinity in some instances of the 3 body problem. In fact, the recent work of C. Fefferman (fields medalist) https://arxiv.org/pdf/2108.04887.pdf can be deduced from our previous results. He was aware of it in the review process of his paper and genteely sent me an email notifying it.

I have developed new techniques to solve problems related to exponentially small phenomena: Gauss-Seidel fixed point arguments, matching complex machinery, systematic study of the inner equation. They have been broadly used in a plethora of problems and now are starting to getting the attention of the international mathematical community: I have been invited (2021) to the prestigious Workshop of Dynamical Systems in Oberwolfach (only attendance by invitation is allowed) and I have begun to collaborate with prestigious mathematicians as M. Bruna (Cambridge), J.P. Marco (Sorbonne) and H. Hansmann (Utrecht).

My work [4], stablishes computable (by means of Stokes constants) conditions that a given analytic unfolding of a Hopf-zero singularity has to satisfy to ensure the existence of Shilnikov bifurcations and therefore of chaotic dynamics closing an open conjecture since 1984. This is the last of four papers [7,6,5,4] involving delicate exponentially small asymptotic estimates. Among other technicalities partially developed in [9], the so-called inner equations play a relevant role: the Stokes constants come from appropriate solutions of such equations. My paper *The inner equation for one and a half degrees of freedom rapidly forced Hamiltonian Systems* (2006), also [8], was the first one in dealing with the inner equation in a general setting. These tecniques allows to prove chaotic co orbital motions in the RP3BP.

In my work 'Structure and Gevrey asymptotic of solutions representing topological defects to some partial differential equations' I prove the existence and uniqueness of solutions of the inner equation that satisfy the rigidly rotating spiral waves in Ginzburg-Landau systems. The project plans to perform a rigorous study of formal matched asymptotic expansions to prove that the so-called asymptotic wave number is exponentially small with respect to the twist parameter. This is the first time that such an approach has been done.

In the last 10 years, I have published 12 papers all of them in Q1 (4 in D1) with 639 published pages. Since 2018, I have given 6 invited conferences, 3 of them plenary talks, MSRI (U. Berkeley), CSASC2018, Oberwolfach. I am anonymous referee of, among others, Memoirs of the AMS.

I was advisor of O. Castejón, *Study of invariant manifolds in two different problems: the Hopf-zero singularity and neural synchrony* (2015) and I am advisor of:

- Mar Giralt, *Homoclinic and chaotic phenomena around L_3 in the restricted 3-body problem*, expected date 2022.
- Román Moreno, *The role of the resonances in the Arnold's diffusion*, expected date 2024.
- Dídac Gil, *Splitting of separatrices in semi-standard maps and 2-d.o.f Hamiltonian systems and Stokes constants*, expected date 2025.

I am the responsible of the social media of the SCM on my role of Academic Secretary. I organized the events to celebrate the Women in Mathematics day in 2020, 2021 (the interview video https://vimeo.com/546154150/d995d305c5 encourages young women to study scientific careers) and also the 'Jornada SCM, Matemàtiques i Covid-19' (2020).

Current preprints:

A. I. Baldomá, M. Giralt, M. Guardia, *Breakdown of homoclinic orbits to L3 in the RPC3BP (I). Complex singularities and the inner equation*, https://arxiv.org/pdf/2107.09942.pdf
B. ---, *Breakdown of homoclinic orbits to L3 in the RPC3BP (II). An asymptotic formula*, https://arxiv.org/pdf/2107.09941.pdf

Part C. RELEVANT MERITS

C.1. Publications

In the last 10 years, I have published 12 papers, all of them in Q1 and 4 in D1. The total amount of published pages is 639.

1. I. Baldomá, E. Fontich, P. Martín, *Whiskered parabolic tori in the planar (n+1)-body problem*, Communications in Mathematical Physics 374 (2020), no.1, 63-110.
2. I. Baldomá, E. Fontich, P. Martín, *Invariant manifolds of parabolic fixed points (I). Existence and dependence on parameters*, Journal of Differential Equations 268 (2020), no.9, 5516-5573.
3. I. Baldomá, E. Fontich, P. Martín, *Invariant manifolds of parabolic fixed points (II). Approximations by sums of homogeneous functions*, Journal of Differential Equations 268 (2020), no.9, 5574-5627.
4. I. Baldomá, S. Ibáñez, T.M. Seara, *Hopf-zero singularities truly unfold chaos*, Communications in Nonlinear Science and Numerical Simulation 84 (2020), 19pp.
5. I. Baldomá, O. Castejón, T.M. Seara, *Breakdown of a 2D heteroclinic connection in the Hopf-zero singularity (I)*, Journal of Nonlinear Science 28 (2018), no.5, 1551-1627.
6. I. Baldomá, O. Castejón, T.M. Seara, *Breakdown of a 2D heteroclinic connection in the Hopf-zero singularity (II): the generic case*, Journal of Nonlinear Sicence 28 (2018), no.4, 1489-1549.
7. I. Baldomá, O. Castejón, T.M. Seara, *Exponentially small heteroclinic breakdown in the generic Hopf-zero singularity*, Journal of Dynamics and Differential Equations 25 (2013), no.2, 335-392.
8. I. Baldomá, P. Martín, *The inner equation for generalized standard maps*, SIAM Journal on Applied Dynamical Systems 11 (2012), no.3, 1062-1097.
9. I. Baldomá, E. Fontich, M. Guardia, T.M. Seara, *Exponentially small splitting of separatrices beyond Melnikov analysis: rigorous results*, Journal of Differential Equations 253 (2012), no.12, 3304-3439.
10. M. Aguareles, I. Baldomá, *Structure and Gevrey asymptotic of solutions representing topological defects to some partial differential equations*, Nonlineary 24 (2011), no.10, 2813-2847.

C.2. Congress

1. *Chaotic phenomena around L_3 in the restricted 3-body problem*. Oberwolfach Workshop Dynamische Systeme, ID 2128, 2021 (invited lecture).

2. *Some instances where we can encounter a beyond all order phenomenon*, invited talk at CRM International Conference on Dynamics in Systems and Synthetic Biology, 2021.
3. *Chaotic phenomena around L_3 in the RPC3BP,* invited talk in Barcelona Mathematical Days, online talk, 2020.
4. *Invariant manifolds, local and global behavior,* plenary conference in Join meeting of the Csech, Solvenian, Austrian, Slovak and Catalan mathematical societies, CSASC2018, Bratislava, Slovaquia, 2018
5. *Invariant stable manifolds associated to parabolic objects with applications to Celestial mechanics*, plenary talk in Connections for women: Hamiltonian systems, from topology to applications through analysis, MSRI, Berkeley, California, 2018
6. *The Shilnikov Bifurcation through a beyond all order phenomenon*, invited talk in MURPHYS-HSFS: Interdisciplinary workshop on multiple scale systems, systems with hysteresis and trends in dynamical systems, Bellaterra, Barcelona, 2018

Two congress I am invited have been postposed

1. Invited talk in AIMS Conference, Atlanta 2020.
2. Comunication in DSDFE 2021, Krynica-Zdrój, Poland 2021.

C.3. Research projects

I have participated as investigator in the funded research projects

1. Maria de Maeztu Award for Centers and Units of Excellence in R&D (CEX2020-001084-M). Scientific director: M. Guardia, CRM, 2.000.000€.
2. Dinámica Asociada a Conexiones entre Objetos Invariantes con Aplicaciones a la Neurociencia y la Mecánica, PGC2018-098676-B-I00, (AEI/FEDER/UE), IP.: T. M-Seara and G. Huguet, 2019-2021, 164.318€.
3. Dinámica, atractores, No linealidad, Caos y estabilidad: Red de excelencia RED2018-102324-T(MCIU), IP.: J. Torregrosa, 2020-2022, 21.000€.
4. Grup de Recerca Consolidat, Sistemes Dinàmics de la UPC, 2017SGR1049 (AGAUR), IP: T. M-Seara, 2018-2021, 44.480€.
5. Dinámica Asociada a Conexiones entre Objetos Invariantes, Aplicaciones a Astrodinámica, Neurociencia y Otras Aplicaciones, MTM2015-65715-P (MECC-FEDER), IP: T. M-Seara, 2016-2018, 202.312 euros
6. Dinámica, Atractores, No linealidad, Caos y Estabilidad, MTM2016-81902-REDT, (MCIU), IP: T. M-Seara, 2017-2019, 11.000€.
7. Grup de Recerca Consolidat, Sistemes Dinàmics de la UPC, 2014SGR-504 (AGAUR), IP: T. M-Seara, 2014-2016, 63 000€.
8. Brazilian--European Partnership in Dynamical Systems (BREUDS), European Call. Marie Curie Action FP7-PEOPLE-2012-IRSES. IP: Jerome Lamb (Imperial College). (participation of 30 Univ.), 2013-2016, 707.000€.
9. Dinamica asociada a conexiones entre objetos invariantes, aplicaciones a astrodinamica, neurociencia y otros campos, MTM2012-31714, (MCI), IP: A. Delshams, 2013-2016, 281.600€.
10. Dinámica Asociada a conexiones entre objetos invariantes, Astrodinámica, Neurociencia y otras Aplicaciones, MTM2009-06973 (MCI), IP: A. Delshams, 2010-2013, 533.489€.

C.4. Contracts, technological or transfer merits