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|--------------------------------------|---------------|--------------------------------------|------------|
| <b>Part A. PERSONAL INFORMATION</b>  |               | <b>CV date</b>                       | 09-24-2018 |
| First and Family name                | Henar Herrero |                                      |            |
| Social Security, Passport, ID number | 09297081K     | Age                                  | 52         |
| Researcher numbers                   | Researcher ID |                                      |            |
|                                      | Orcid code    | http://orcid.org/0000-0002-8598-0217 |            |

### A.1. Present position

|                                |   |        |  |
|--------------------------------|---|--------|--|
| Name of University/Institution | Universidad de Castilla-La Mancha                   |        |  |
| Department                     | Mathematics   |        |  |
| Address and Country            | Avda. Camilo José Cela 10                           |        |  |
| Phone number                   | 675674951   | E-mail | <a href="mailto:Henar.Herrero@uclm.es">Henar.Herrero@uclm.es</a> |
| Present position               | Catedrática de Universidad (Professor)              | From   | 07/2003  |
| Espec. cód. UNESCO             | 120613, 220504                                      |        |  |
| Palabras clave                 | Natural convection, instabilities, spectral methods |        |  |

### A.2. Education

| Degree/PhD         | University                | Year |
|--------------------|---------------------------|------|
| Mathematics Degree | Universidad de Valladolid | 1989 |
| Physics PhD        | Universidad de Navarra    | 1994 |

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

4 sexenios (last one 2014), 63 JCR articles, 3 thesis supervised, 800 cites, 40 cites per year 2013-2017, 35 works in Q1, h index 13, normalized index larger than 1,5.

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

Degree in Mathematics from the University of Valladolid with a specialization in numerical analysis, PhD in Physics from the University of Navarra on numerical and asymptotic resolution of several fluid dynamics problems with heating, where instabilities or bifurcations between different patterns appear. This has been the main line of my research, attending to the different aspects: 1) numerical methods, and their behavior in this type of problems, mainly we use Chebyshev and Legendre collocation methods, reduced bases, POD, domain decomposition; 2) instabilities and bifurcations, we perform numerical tracking of bifurcation branches of solutions and theoretical studies in some of the problems; 3) the relevant physics of the problems is also studied, horizontal gradients produce rich phenomenology, from spiral waves with different wave numbers to vertical vortices similar to dust devils or tornadoes. We pretend to understand these phenomena from their mechanisms of action, and improve the numerical methods to include different scales of study. I am presently a Professor of Applied Mathematics at the University of Castilla-La Mancha since 2003. Below I summarize other aspects of my curriculum.

- Research projects: Main researcher of 5 national projects, 4 regional projects and 3 special actions, participation in 9 more projects, one of them European.
- Publications: 63 publications indexed in ISI-JCR, 25 non-indexed, 8 scientific disseminations and 3 of didactics of mathematics, 3 book chapters and 2 teaching books.
- PhD thesis supervised: 6 thesis supervised. Direction of 14 research projects and a final degree project.
- Visits: Institute of Atmospheric Sciences and Climate (CNR, Rome, 15 days 2015). Laboratoire Jacques Louis Lions (Paris VI, Postdoctoral, 6 months); Department of Applied Mathematics and Theoretical Physics (U. Cambridge, predoctoral 3 months), Department of Engineering Sciences and Applied Mathematics (U. Northwestern, predoctoral 4 months), Center for Nonlinear Phenomena and complex Systems (Free U. of Brussels, predoctoral 3 months).

- Conferences: contributions to more than 100 international and national conferences, 25 of them invited and 15 in universities.
- Organization of activities: Chair of two national congresses, 15 scientific conferences, several seminar cycles, and four special sessions in national and international congresses.
- Scientific Committee: CIMPA, two international congresses and several national congresses.
- Management: Head Dept. of Mathematics (UCLM, 08-12 and 16-present), Head of the Research Institute IMACI (UCLM, 12-16), RSME Secretary (09-15), Coordinator: FisyMat UCLM PhD Program (10-16), Master Secondary Teacher (09-13), Master FisyMat UCLM (06-09).
- Other: extensive evaluation work in ANECA, ANEP, CONICYT (Chile), regional agencies, panel of expert projects, referee of more than 70 articles in international journals, 15 reviews AMS, participation in juries of thesis and faculty examinations.
- Teaching: Numerical Calculus, Numerical Analysis of EDPs and Visualization, Numerical Analysis, Partial Differential Equations, Mathematics, Algebra, Statistics, Calculus and Differential Equations, Bases and Fundamentals of the Mathematics Curriculum, in the degrees of Chemical Engineering, Industrial Engineering, Chemistry, Master Physics and Mathematics, and Master of Teacher Secondary School Mathematics.

## Part C. RELEVANT MERITS

### C.1. Publications (including books)

1. H. Herrero, F. Pla and M. Ruiz-Ferrández. A Schwarz Method for a Rayleigh-Bénard Problem. J. of Scientific Computing, <https://doi.org/10.1007/s10915-018-0771-1>, 2018.
2. D. Castaño, M. C. Navarro and H. Herrero. Routes to chaos from axisymmetric vertical vortices in a rotating cylinder. Applied Mathematical Modelling. doi: 10.1016/j.apm.2017.09.010, 2017.
3. D. Castaño, M. C. Navarro and H. Herrero. Double vortices and single-eyed vortices in a rotating cylinder under thermal gradients. Computers and Mathematics with Applications 73, 2238-2257, 2017.
4. D. Castaño, M. C. Navarro and H. Herrero. Evolution of secondary whirls in thermoconvective vortices: strengthening, weakening and disappearance in the route to chaos. PRE 93(1), 013117, doi: 10.1103/PhysRevE.93.013117, 2016.
5. M. C. Navarro, D. Castaño and H. Herrero. Secondary whirls in thermoconvective vortices developed in a cylindrical annulus locally heated from below. Communications in Nonlinear Science and Numerical Simulation, 28, 201-209, DOI: 10.1016/j.cnsns.2015.04.019, 2015.
6. D. Castaño, M. C. Navarro and H. Herrero. Thermoconvective vortices in a cylindrical annulus with varying inner radius. Chaos: An Interdisciplinary Journal of Nonlinear Science 24(4), DOI: 10.1063/1.4898732, 2014.
7. H. Herrero, Y. Maday and F. Pla. RB (Reduced basis) applied to RB (Rayleigh-Bénard). Computer Methods in Applied Mechanics and Engineering 261-262, 132-141, 2013.
8. M. C. Navarro and H. Herrero. Vortex generation by a thermoconvective instability in a cylindrical annulus non homogeneously heated. Physica D-Nonlinear Phenomena 240, 1181-1188, 2011.
9. R. Pardo, H. Herrero and S. Hoyas. Theoretical study of a Bénard-Marangoni problem. Journal of Mathematical Analysis and Applications 376, 231-246, doi:10.1016/j.jmaa.2010.10.064, 2011.

10. F. Pla, H. Herrero and O. Lafitte. Theoretical and numerical study of a thermal convection problem with temperature-dependent viscosity in an infinite layer. *Physica D-Nonlinear Phenomena* doi:10.1016/j.physd.2010.03.001, 2010.

## C.2. Research projects and grants

1. Modelización numérica para problemas de interés geofísico. Ministerio de Economía y Competitividad, MTM2015-68818-R, 2016-2018, 37.400,00 €. IP: Henar Herrero Sanz.

2. Modelización numérica de fluidos biológicos y geofísicos. Vicerrectorado de Investigación y Política Científica de la UCLM, GI20174046. 2017, 6.779,70 €. IP: Henar Herrero Sanz.

3. Modelización numérica de fluidos biológicos y geofísicos. Vicerrectorado de Investigación y Política Científica de la UCLM, GI20163529. 2016, 6.826,00 €. IP: Henar Herrero Sanz.

4. Matemáticas para problemas de interés geofísico y consultoría. Ministerio de Economía y Competitividad, MTM2012-37642. 2013-2015, 21.500,00 €. IP: Henar Herrero Sanz.

5. Matemática de modelización, numérica y estadística para dinámicas tumoral y de fluidos y consultoría. Ministerio de Ciencia e Innovación, MTM2009-13084, 2009-2012, 30.300,00 €. IP: Henar Herrero Sanz.

6. Matemáticas para varios problemas geofísicos, crecimiento tumoral y consultoría. Junta de Comunidades de Castilla-La Mancha, PAI08-0269-1261, 2008-2010, 35.000,00 €. IP: Henar Herrero Sanz.

7. Estudio numérico y teórico de varios problemas de ecuaciones en derivadas parciales de dinámica de fluidos con aplicaciones en geofísica. Ministerio de Educación y Ciencia, MTM2006-14843-C02-01, 2006-2009, 27.346,00 €. IP: Henar Herrero Sanz.

## C.3. Contracts C.4. Patents

## C.5. Institutional responsibilities

- Head of the Department of Mathematics of University of Castilla-La Mancha (UCLM), 2008-2012 and 2016-present.

- Head of the research institute IMACI at UCLM, 2012-2016.

- Secretary of the Real Sociedad Matemática Española (RSME), 2009-2015.

- Coordinator of PhD degree FisMat at UCLM, 2010-2016.

- Coordinator of the master degree Teacher of Secondary School Mathematics at UCLM, 2009-2013.

- Coordinator of the master degree Física y Matemáticas at UCLM, 2006-2009.

- Member of Government Council UCLM, 2016-present.

- Member of Claustro of UCLM, 2017-present.

- Member of Government Council of Facultad de Ciencias y Tecnologías Químicas at UCLM, 1996-present.

**C.6. Membership of scientific societies:** RSME (2003-present), SEMA (1997-present), RSEF (1997-2017), EMS (2003-2010), AMS (2003-2010), SIAM (2003-2010).

## **C.7. Thesis supervised last 10 years**

1. Estudio teórico y numérico de fluidos con viscosidad variable. Francisco Pla Martos. Universidad de Castilla-La Mancha. Departamento de Matemáticas, Doctorado FisyMat. Directoras: H. Herrero y A.M. Mancho. 14 de abril de 2009 (european).

2. Mathematical modeling of neoplasms: ODEs and statistical análisis of medical data. Joanna M. Chrobak. Universidad de Castilla-La Mancha. Departamento de Matemáticas, Doctorado FisyMat. H. Herrero. 17 de diciembre de 2010 (european).

3. Numerical study of swirl instabilities in Boussinesq Navier-Stokes models with geophysical applications. Damián Castaño Torrijos. Universidad de Castilla-La Mancha, Departamento de Matemáticas, Doctorado FisyMat. Directoras: H. Herrero y M<sup>a</sup> Cruz Navarro. 16 de diciembre de 2016 (international).

## **C.8. Evaluation tasks**

- President of the Comitee of Revision of Sciences CU-ACADEMIA ANECA, 2017-present, Member of the Comitee ACADEMIA CU-Ciencias ANECA, 2011-2013. Expert ANECA, 2011-present.

- Member of comisions ANEP: evaluation of bilateral actions, regional and national research projects, postdoctoral grants and programs Juan de la Cierva and Ramón y Cajal. Evaluations ANEP, 2005-present.

- Member of Research Projects Comitee of Physics two years.

- Evaluation of scientific projects CONICYT (Chile).

- Referee of papers for JCR journals (60) and Reviews AMS (15).

- Member of juries of PhD thesis (24), research works (24), and faculty examinations (70).

## **C.7. International Comitees**

- Member of CIMPA Scientific Council 2017-present.

- Member of the Jury Habilitation a Diriger des Recherches (HDR), Francia, 2017.

- Scientific comitee of international conferences: NanoMath 2016 y 6th Ibearin Mathematical Meeting 2016.

- President of the Outreach Comitee of ICIAM 2019.

## **C.8. Management of Scientific Activity**

- Main Researcher of 5 national projects, 4 regional projects and 3 actions.

- Organization of activities (national): Chair of the Congreso XXI CEDYA-XI CMA 2009 in Ciudad Real, Chair of the Hidrodynamical Instabilities Days I and II in Ciudad Real 2004 and 2009, Chair of the Centenary Colloquium of RSME2011 in Ciudad Real, Workshop Mathematics of Planet Earth: Land, Sea and Air in 2013, scientific comitee of NoLineal2014 and XXII CEDYA-XII CMA 2011.