

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 | | | |
| Family name | | | |
| Gender (*) | | Birth date (dd/mm/yyyy) | |
| Social Security, Passport, ID number | | | |
| e-mail | | URL Web | |
| Open Researcher and Contributor ID (ORCID) (*) | | | |

(*) Mandatory

A.1. Current position

| | | | |
|-------------------|--|-------------------|-----------|
| Position | Full Professor of Hydraulic Engineering | | |
| Initial date | 17/02/2025 | | |
| Institution | Universidad de Córdoba | | |
| Department/Center | Agronomy (Hydraulic Engineering Area) | ETSIAM | |
| Country | Spain | Teleph. number | 957212241 |
| Key words | Open channel hydraulics; Hydraulic structures; Fluvial hydraulics, Dam hydraulics; Sediment transport; Environmental fluid mechanics | | |

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

| Period | Position/Institution/Country/Interruption cause |
|-----------------------|---|
| 18/06/2019-16/02/2025 | Associate Professor of Hydraulic Engineering/UCO/Spain |
| 01/01/2014-17/06/2019 | Post-doc Researcher RAMÓN & CAJAL (Civil Engineering and Architecture Area)/UCO/Spain |
| 01/01/2013-31/12/2013 | Post-doc Researcher in project P09-AGR4782/UCO/Spain |
| 01/05/2012-31/12/2012 | Post-doc Researcher in project CENIT-Tecoagua/IAS-CSIC/Spain |
| 01/05/2009-30/04/2012 | Post-doc Researcher JAE-DOC/IAS-CSIC/Spain |
| 01/02/2002-30/04/2009 | Hydraulic Engineer/Water Techniques s.l./Spain |

A.3. Education

| PhD, Licensed, Graduate | University/Country | Year |
|-------------------------|------------------------------|------|
| Ingeniero Agrónomo | Universidad de Córdoba/Spain | 2002 |
| PhD | Universidad de Córdoba/Spain | 2008 |

(Include all the necessary rows)

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

After finishing my studies of Agricultural engineering in 2002 I worked as consulting hydraulic engineer for 7 years, dedicated to projects of hydraulics and hydrology, with focus on hydraulic structures and river flow. At the end of this period, I realized that my vocation was Academia, so I started my PhD studies at UCO simultaneously to my work as a hydraulic engineering consultant. I obtained the PhD degree in 2008, presenting my thesis Critical Flow

in Hydraulic Structures (compendium of 10 JCR articles; mark: CUM LAUDE). After reaching the PhD degree I left engineering practice and moved to CSIC through a post-doc fellowship JAE-DOC at the Institute of Sustainable Agriculture of CSIC in Cordoba. I completed my training in hydraulic engineering through a postdoctoral stay at VAW (Laboratory of Hydraulics, Hydrology and Glaciology), ETH Zurich, Switzerland, under the supervision of Professor W.H. Hager. I was a Ramón y Cajal researcher in the thematic area of Civil Engineering and Architecture, at the University of Cordoba (2014/2019). Currently I am Full Professor of Hydraulic Engineering at the Department of Agronomy of the University of Córdoba (Maria de Maeztu Unit of Excellence in Research 2020-2025; DAUCO).

I have developed and currently lead an innovative research line since 2008 on *Free Surface Flows* with emphasis on Hydraulic structures, River dynamics and Environmental fluid mechanics, with a scientific approach to process understanding combining advanced frameworks on numerical modeling, experimental work and analytical methods. Our pioneering works on topics such as spillway flows, hydraulic jumps, dam break waves and water-sediment geomorphic flows resulted in impact publications in highly ranked journals, and in intense international collaborations and projection. I have authored 104 scientific papers in impact journals (h-22, Scopus), most of them as senior author, other indexed publications, and two textbooks on free surface flows: “*Non-hydrostatic free surface flows*” and “*Shallow water hydraulics*”. My research has a high degree of internationalization, having conducted scientific papers in collaboration with renowned experts in Fluid Flow from four continents (America, Europe, Asia and Oceania). In the period 2008-2024 104 JCR papers were published, 78 of them in collaboration with international experts. Our interdisciplinary approach to tackle fluid flow problems permitted us to set up novel methodologies in hydraulic structures and river dynamics research aimed at understanding and predicting the challenging conditions triggered by the increased floods resulting from extreme climate change scenarios, like in the case of the operational conditions of dams receiving increased upstream hydrographs, or the catastrophic geomorphic dam break waves propagating in the river environment. The research line has been successfully funded since 2014 by several competitive national projects that I lead (EROSIONA, ROLLER and VAMONOS), which has been key in stablishing an international scientific network of collaboration with prestigious experts in my field of research, such as Prof. W.H. Hager of ETH-Zurich, Prof. Subhasish Dey of the Indian Institute of Technology in Kharagpur, and Prof. Hubert Chanson of the University of Queensland. My research has been recognized through several Awards, most of them international: Award to the best PhD work in the field of science and technology academic course 2007/2008, by UCO in year 2009; best reviewer award of Journal of Hydraulic Research during period 2010-2012, by IAHR in year 2013; Honorable Mention Paper Award for the contribution “Minimum specific energy and transcritical flow in unsteady open channel flow”, Published in the Journal of Irrigation and Drainage Engineering ASCE, in year 2018; Best Associate Editor Award of Journal of Hydraulic Engineering ASCE in year 2024. Transfer of our results is actively done by freely distributing our computer models and experimental results to the scientific community, engineering companies and other organizations.

I am highly committed to the evaluation of scientific works national and internationally reviewing papers, project proposals and PhD thesis. I am Associate Editor of several high-impact journals: *Journal of Hydrology* (Elsevier; 2025-Present), *Journal of Hydraulic Engineering* (ASCE; 2010-Present), *Journal of Irrigation and Drainage Engineering* (ASCE; 2021-Present), *Environmental Fluid Mechanics* (Springer; 2022-Present), *International Journal of Sediment Research* (Elsevier; 2021-Present), *Scientific data* (Nature; 2024-Present), and *Water*, hydraulics and hydrodynamics section (MDPI; 2024-Present). I am also Associate Editor of *Revista Ingeniería del Agua* (IWA publishing; 2014-present), a very relevant Spanish journal of hydraulic engineering.

I teach hydraulics and hydrology in degree and master at the University of Córdoba, and I regularly mentor students in both Master and PhD thesis.

Part C. RELEVANT MERITS (sorted by typology)

C.1. Publications (see instructions)

- [1] Cantero-Chinchilla, F.N., **Castro-Orgaz, O.**, Ali, S.Z., Dey, S. (2024). Shallow water hydrodynamics: Surge propagation and sill-controlled flows. *Physics of Fluids*, 36(12), 125171, <https://doi.org/10.1063/5.0240401>
- [2] Escalante, C., Morales de Luna, T., Cantero-Chinchilla, F.N., **Castro-Orgaz, O.** (2024). Vertically averaged and moment equations: New derivation, efficient numerical solution and comparison with other physical approximations for modeling non-hydrostatic free surface flows. *Journal of Computational Physics*, 504, 112882.
- [3] **Castro-Orgaz, O.**, Hager, W.H., Katopodes, N.D. (2023). Variational models for nonhydrostatic free-surface flow: A unified outlook to maritime and open-channel hydraulics developments. *Journal of Hydraulic Engineering*, 149(7), 04023014.
- [4] **Castro-Orgaz, O.**, Gamero, P.P., Cantero-Chinchilla, F.N., Morales de Luna, T., Hager, W.H., Bombardelli, F.A. (2023). Variational RANS modeling of hydraulic jumps. *Ocean Engineering*, 283C, 115037.
- [5] Gamero, P., Cantero-Chinchilla, F.N., Bergillos, R.J., **Castro-Orgaz, O.**, Dey, S. (2022). Shallow-water lee-side waves at obstacles: Experimental characterization and turbulent non-hydrostatic modeling using weighted-averaged residual equations. *Environmental Modeling and Software*, 155, 105422.
- [6] Cantero-Chinchilla, F.N., **Castro-Orgaz, O.**, Khan, A.A. (2019). Vertically-averaged and moment equations for flow and sediment transport. *Advances in Water Resources* 132, 103387.
- [7] **Castro-Orgaz, O.**, Hager, W.H. (2019). Shallow water hydraulics. DOI 10.1007/978-3-030-13073-2, 563 pages, Springer, Berlin.
- [8] **Castro-Orgaz, O.**, Hager, W.H. (2017). Non-hydrostatic free surface flows. *Advances in Geophysical and Environmental Mechanics and Mathematics*. DOI 10.1007/978-3-319-47971-2, 696 pages, Springer, Berlin.
- [9] Cantero-Chinchilla, F., **Castro-Orgaz, O.**, Dey, S., Ayuso, J.L. (2016). Non-hydrostatic dam break flows. I: Physical equations and numerical schemes. *Journal of Hydraulic Engineering* 142(12), 04016068.
- [10] Cantero-Chinchilla, F., **Castro-Orgaz, O.**, Dey, S., Ayuso, J.L. (2016). Non-hydrostatic dam break flows. II: One-dimensional depth-averaged modelling for movable bed flows. *Journal of Hydraulic Engineering* 142(12), 04016069.

C.2. Congress

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] Turbulence modeling for non-hydrostatic flows in environmental hydraulics (*ROLLER*), Reference: PID2020-114688RB-I00, Funds: 181.500 €, Period: 2021-2025, Principal Investigator: **Oscar Castro Orgaz**
- [2] Desarrollo de modelos no hidrostáticos para estudios hidroambientales (*VAMONOS*), Reference: CTM2017-85171-C2-1-R. Coordinated project with Univ. Da Coruña, Funds: 142.780 €, Period: 2018-2021, Principal Investigator: **Oscar Castro Orgaz** (coordinator of the two subprojects)
- [3] Reformulación de los modelos de erosión y transporte de sedimentos desde una perspectiva física (*EROSIONA*), Reference: CTM2013-45666-R, Funds: 82.280 €, Period: 2014-2016, Principal Investigator: **Oscar Castro Orgaz**

C.4. Contracts, technological or transfer merits, Include patents and other industrial or intellectual property activities (contracts, licenses, agreements, etc.) in which you have collaborated. Indicate: a) the order of signature of authors; b) reference; c) title; d) priority countries; e) date; f) Entity and companies that exploit the patent or similar information, if any.

Free source codes and software distributed

- [1] **Castro-Orgaz, O.** (2019). Numerical Library of Shallow Water Equations. Supplementary material. Collection of free educational source codes. In: *Shallow Water Hydraulics*, Springer. https://link.springer.com/chapter/10.1007/978-3-030-13073-2_12

[2] VAM_Model_Software: A Matlab software platform for modelling vertically-integrated non-hydrostatic flows with moment equations.

Supplementary material to paper: Gamero, P., Bergillos, R. J., Cantero-Chinchilla, F. N., & **Castro-Orgaz, O.** (2020). A MATLAB software platform for modelling vertically-integrated non-hydrostatic flows with moment equations. *Environmental Modelling & Software*, 127, 104674. https://github.com/Frncch/VAM_Model_Software

[3] Waves_Transformation_Model_Software: A depth-integrated, weighting-averaging residual method-based model to study shallow-water lee-side waves at obstacles.

Supplementary material to paper: Gamero, P., Cantero-Chinchilla, F. N., Bergillos, R. J., **Castro-Orgaz, O.**, & Dey, S. (2022). Shallow-water lee-side waves at obstacles: Experimental characterization and turbulent non-hydrostatic modeling using weighted-averaged residual equations. *Environmental Modelling & Software*, 155, 105422.

https://github.com/Frncch/Waves_Transformation_Model_Software

Free experimental databases distributed

[1] Experimental data projects VAMONOS & ROLLER; supplementary material to paper: Cantero-Chinchilla, F. N., **Castro-Orgaz, O.**, Zeeshan, Sk A., & Dey, S. (2024). Experiments on hydraulic jumps over uneven bed for turbulent flow modelling validation in river flow and hydraulic structures. *Scientific Data*.

<https://zenodo.org/records/10581318>

[2] Cantero-Chinchilla, F. N., **Castro-Orgaz, O.** (2024). Experimental data for validation of a variational RANS level III flow model: Water waves over an array of obstacles and Ogee weir flows, Zenodo, Dataset. <https://doi.org/10.5281/zenodo.13809988>

Registered Intellectual property

[1] Authors in order: Bergillos Meca, Rafael J.; **Castro-Orgaz, Oscar**; Cantero-Chinchilla, Francisco Nicolás; Gamero Ojeda, Pedro

Reference: CO-193-19

Title: VAM-MODEL, Vertically-Averaged and Moment equations MODEL

Priority countries: Spain

Date: 05/07/2019

C.5. Others

Directed PhD thesis

[1] Title: *Estudio experimental y numérico de la propagación de ondas no-hidrostáticas sobre obstáculos sumergidos* (10/04/2024)

Student: Pedro Pablo Gamero Ojeda

Funds: contract in project VAMONOS

Publications: Compendium of 3 JCR scientific papers. Thesis linked to projects VAMONOS and ROLLER

Mark: SOBRESALIENTE CUM LAUDE

[2] Title: *Hydraulic modeling of suspended and bed load transport in erosive flows* (26/09/2016)

Student: Francisco Nicolás Cantero Chinchilla

Funds: FPU fellowship directed by Oscar Castro Orgaz

Awards: International doctorate

Publications: Compendium of 5 JCR scientific papers. Thesis linked to project EROSIONA

Mark: SOBRESALIENTE CUM LAUDE

Teaching materials:

[1] Ayuso, J.L., **Castro-Orgaz, O.** (2021). *Hidrología de superficie: Operación de ríos y embalses en cuencas hidrográficas*. ISBN 9788418392665, 223 páginas, Aula Magna, McGraw-Hill Interamericana de España, Madrid.

[2] **Castro-Orgaz, O.** (2021). *PAQUETE INFORMÁTICO ENCHARCA*. Zenodo. <https://doi.org/10.5281/zenodo.10199822>