



AYUDAS RAMÓN Y CAJAL CONVOCATORIA 2015

Turno de acceso general

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Referencia: RYC-2015-17367
Área Científica: Ingeniería Civil y Arquitectura
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Título:

Desarrollo de técnicas avanzadas de mecánica computacional para la simulación numérica en tiempo real de problemas de diseño en ingeniería

Resumen de la Memoria:

I am a researcher focused in Computational Methods for Engineering Design. During my PhD my research focused in the development of fixed-mesh finite element strategies for the numerical simulation of fluid mechanics, solid mechanics and fluid-structure interaction problems. The main contributions in my thesis were several methods for imposing boundary conditions in embedded finite element meshes, and the development and extension to multiphysics problems of the Fixed-Mesh ALE method.

After the completion of my PhD in January 2011, I was awarded several prizes which recognize the quality of the developed research: The Extraordinary Doctorate Award from the UPC, the Award to the Best Thesis in Numerical Methods in Engineering, from the Spanish Association for Numerical Methods in Engineering (SEMNI), and I was finalist of the Award to the Best Thesis in Computer Methods in Applied Sciences from the European Community on Computer Methods in Applied Sciences (ECCOMAS).

Since January 2011 I have been working as a post-doctoral researcher at the International Center for Numerical Methods in Engineering (CIMNE). My research during my post-doctoral stage at CIMNE has been focused in Aeroacoustics, Reduced-Order Models and the numerical simulation of atmospheric seeing, a key ingredient in the design of modern ground-based telescopes. The time spent in CIMNE has allowed me to participate in several European Research Projects in Aeroacoustics, Turbulence, and Reduced-Order Models. I have also been awarded a Juan de la Cierva Post-doctoral grant and I have been the principal investigator of a Spanish National Research Plan project, in which I have been leading a group devoted to research in atmospheric seeing optimization of Extremely Large Telescopes. I have also been the principal investigator of two projects of the Spanish National SuperComputing Center (Red Española de Supercomputación) which have granted our research group access to the Marenostrum supercomputing facilities.

The output of all of this research has translated into 18 published and 5 submitted papers at the time of presenting this candidacy.

Resumen del Currículum Vitae:

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Nombre: FARRÉ OLALLA, MARIA JOSÉ

Referencia: RYC-2015-17108

Área Científica: Ingeniería Civil y Arquitectura

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Título:

water purification and disinfection

Resumen de la Memoria:

I am an internationally recognized water treatment specialist investigating oxidation mechanisms of contaminants, natural organic and inorganic matter during the treatment of drinking and wastewater. My endeavours have been focused on understanding how disinfection byproducts (DBPs) form to adapt treatment processes to control their formation in drinking and recycled water production to ensure the end-users health is safeguarded.

I completed my PhD in in 2007 at the Autonomous University of Barcelona as a compendium of seven journal articles with **cum laude** distinction. With my PhD work, the great potential of coupling chemical oxidative and biological treatment to remove pesticides from water was demonstrated. In 2008 I moved to Australia to initiate my postdoctoral research at the prestigious Advanced Water Management Centre (AWMC) at The University of Queensland, a global top 100 university in all respective rankings, optimizing disinfection practices in full scale water reuse applications. My findings were rapidly transferred to the industry and applied in a water reuse scheme that can produce up to 232,000 m³/day.

By 2009, I extended my research focus and in 2010 I did a short research stay at Prof Howard Weinberg's laboratory (University of North Carolina, U.S.A) to learn cutting-edge analytical techniques for emerging DBP analysis for knowledge-transfer to Australia. During this time, I was able to obtain funding as principal investigator through different competitive grant schemes in Australia and the USA and direct industry funding to establish my own research group that investigated the formation and control of DBPs in drinking and recycled water. The budget of these projects allowed me to support from 2011 to 2014 two PhD students that I supervised (one finished in 2014), a postdoc and two research technician and established fruitful connections between the University of Queensland and the water industry in Australia. I have also supervised 4 honours and master students, all of them completed with awards.

The scientific productivity of these 5 years is summarized in 4 final public project reports (two of them for the prestigious U.S based agencies Water Research Foundation and WateReuse Research Foundation and all as first author) and 21 publications, apart from numerous contributions to international conferences as detailed below.

From October, 2013 until October 2014, I was on a maternity leave.

After my postdoctoral period I was awarded with a prestigious and highly competitive (<12% success rate) International Incoming Fellowship Grant worth **€173,370** in the framework of a Marie-Curie (MC) Action that allow me to return to Spain. I am also currently an adjunct fellow of AWMC and a visitor scholar at the University of North Carolina.

Since my incorporation in ICRA I have negotiated and conducted two research contracts with the relevant industry in my field (24,000 Euros), published 3 research papers (five more in preparation), attended 1 international and 1 national conferences. I have also supervised an Erasmus student apart from continuing with the supervision of my PhD student from my former institution in Australia. I have established a fruitful collaboration with Thermo Fisher Scientific and collaborated in 2 european (DemEAUme and Endetech) and 1 national (WATER-FATE) projects, apart from conducting my MC Project

Resumen del Currículum Vitae:

My scientific production encompasses 28 peer-reviewed journal publications (15 of which as first author, and 10 as senior and corresponding author), 1 project report published and sold as a book, 3 peer-reviewed book chapter, two published final project reports and more than 25 conference publications. Jointly, these publications have been cited more than 500 times, leading to an H-index of 14. In the last five years my average citation count has been 70 citations per year and I have published 21 articles. Approximately, 75% of my publications are published in Q1 journals and 13 of them in the top 5% impact factor journals of the total of 245 journals included in the categories **Engineering, Civil**, **Engineering, Environmental** and **Engineering, Chemical** by Thompson Reuters Journal Citation Reports. E.g J. Haz. Mat. (IF 4.5), Water Res. (IF 5.5), Env. Sci. Technol. (IF 5.3) and J. Memb. Science (IF 5.1).

I have supervised 2 PhD and 4 honours/master students. My first PhD student graduated in 2014 and the second one is expected to finish during this year.

I have sustained my research since 2009 being responsible of obtaining >800,000 euro through different grant schemes and direct industry funding which allowed me to create a small research group in my former institution. In addition, in 2013 I was awarded with a prestigious and highly competitive (<12% success rate) Marie-Curie International Incoming Fellowship Grant worth **€173,371** enabling to return to Spain.

I have acquired extensive expertise in oxidation treatments and DBP formation in drinking and recycled water in lab-scale, pilot-scale and full-scale systems as evidenced by my list of publications. The experimental approach used in most cases has been a combination between engineering and aquatic chemistry, so a real understanding of the process studied could be achieved. I have fully developed the DBP capabilities at the AWMC and at the ICRA. I am a proficient user of various chromatographic and detection methods, and have vast



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experience in different extraction methods for different compounds according to their chemical properties. As it was my career development goal for this period, I am currently being trained on highly sophisticated mass spectrometry equipment such as GC-QqQ, on-line UPLC-QqQ and UPLC-Orbitrap for the detection and evaluation of natural organic matter and specific DBP precursors. During these years, I have also developed a vast body of knowledge on how to work with DBPs, DBP precursors and chlorine based disinfectants, as well as an excellent understanding of the practices employed in the water industry. I have also previous experience in alternative disinfection treatments such as ozone and UV disinfection. Further, I have also collaborated in research involving electrochemistry, toxicity and bioassays, biofiltration, and membrane bioreactors. These collaborations have given me the opportunity to expand my vision not only to other fields of research but also to closely work with industry and observe how research is translated into real applications.