Tics for a good proposal
An example: DyCon

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CIO-Elche, May 16, 2019

Table of Contents

First evaluation step

Yo have to be within the top 30%

First evaluation step

Out of the, say, 12 panel members, you will be evaluated by 4 of them.

First evaluation step

Thus: Your B1 part will be analysed by, roughly, one expert in your field and 3 in neighbouring areas.

First evaluation step

The thematic distance from evaluators can be as large as the diameter of a broad set of fields covering 25% of the AMS Math Classification or, any other relevant subject classification in your area.

First evaluation step

You will only succeed to get to Step #2 if, from the very beginning to the end, the evaluators find that your proposal is great in all aspects.

First evaluation step

Devote time to think on the main goal of the proposal: innovative, ambitious, relevant, realistic, of current interest,...

First evaluation step

Think what structure you are going to give to your proposal: Objectives, tasks, personnel, chronogram,...

First evaluation step

Build a good abstract, heart taking,... After reading it the evaluator should be aware that your proposal is a top one.

First evaluation step

Build carefully your CV and your ten years track record,... Experts that are far from your field need objective data to identify you as a leader in your field

First evaluation step

Write a delicious short proposal. Add some graphs, plots, diagrams, choose each single word, be precise.

First evaluation step

You have to find the perfect balance between specialisation and broadness

First evaluation step

If you do all this, you will be in Step 2.

Congratulations!

Second evaluation step

Yo have to be AGAIN within the top 30%

Second evaluation step

Out of the, say, 12 panel members, you will be evaluated by 4 of them, ands 4 other external members.

Panel members will complement their first evaluation reading B2. External members will evaluate the whole thing (CV, B1, B2).

Second evaluation step

B2 has to be an upgrade of B1, with excellence aroma, a well structured and justified work plan, the identification of tasks justifying the funding you request.

Second evaluation step

You can apply for funds with ambition. But make it sure that you explain well their need, how they complement the funding you expect to receive from your home institution.

Second evaluation step

Make sure that the research agenda you propose looks innovative and ambitious and feasible, making emphasis on dissemination, societal benefit, technological transfer, etc.

SUGERENCIAS

- Si tienes una buena idea de proyecto trabájala y sométela al ERC. No siempre se gana a la primera (la tasa de éxito es del 15% aproximadamente) pero recibirás sugerencias constructivas.
- El ERC está muy bien organizado. Casi todo lo que necesitas saber está en la guía. ¡Léela!
- La familia ERC es ya muy grande. Cada año 1000 personas trabajan en sus paneles. Seguro que conoces a alguien que puede ayudarte. No dudes en asesorarte al preparar tu proyecto.
- En los “Advanced Grants” no hay entrevista. Te lo juegas todo en la memoria.
- Manda tu propuesta al panel más natural, aquél en el que los miembros del mismo te reconocerán como miembro del área. Puedes guiarte, por ejemplo, por las áreas de las revistas donde has publicado tus trabajos más importantes en los últimos 10años.
- Piensa que serás evaluado por expertos muy próximos a tu área y otros más alejados. A todos ellos tu proyecto les debe parecer excelente.

SUGERENCIAS (II)

- Trabaja el “leadership profile”. El evaluador, al acabar su lectura, debe estar convencido de que eres un investigador de primera fila y con gran potencial.
- Tu proyecto debe girar en torno a ideas y metodologías claras e innovadoras. Asegúrate de que están claramente presentes ya en el resumen y después de que sus contornos se definen tanto en la propuesta larga como en la abreviada.
- El proyecto abreviado (5 pp) es clave pues es la que se analiza en la fase 1.
- La detallada también pues se toma en cuenta en la decisión final.
- Organiza tu proyecto en torno a paquetes de trabajo bien identificados e interconectados, definiendo un área de trabajo concreta pero capaz de generar la dinámica (volumen y calidad) que exige un proyecto ERC.
- En el presupuesto destina gran parte de los recursos a jóvenes investigadores a los que darás oportunidad de incorporarse a tu proyecto a través de llamadas públicas con buena difusión y una evaluación rigurosa. Para poder hacerlo necesitas un buen plan de trabajo y cronograma.
- Todos los centros son elegibles pero asegúrate que en torno al tuyo eres capaz de crear la imagen de un entorno de excelencia, adecuado para el proyecto.

CONFIÉSATE ANTES DE EMPEZAR

- ✓ To what extent is the Principal Investigator's record of research, collaborations, project conception, supervision of students and publications **ground-breaking** and demonstrative of independent **creative thinking** and the capacity to **go significantly beyond the state of the art**?

- ✓ To what extent does the proposed research address **important challenges** at the frontiers of the field(s) addressed? To what extent does it have suitably **ambitious objectives**, which go substantially beyond the current state of the art (e.g. including inter- and trans-disciplinary developments and novel or unconventional concepts and/or approaches)?

- ✓ To what extent does the possibility of a **major breakthrough** with an impact beyond a specific research domain/discipline justify any highly novel and/or unconventional methodologies ("high-gain/high-risk balance")? To what extent is the proposed **research methodology** (including the proposed timescales and resources) appropriate to achieve the goals of the project?

EVALUATION CRITERIA

The evaluation criteria for each step and their interpretation are described in the applicable ERC Work Programme:

The **PI** (intellectual capacity, creative, etc) and the **feasibility** of the scientific approach is assessed at step 1.

The **detailed research methodology** (timescales and resources included) is assessed at step 2.

Table of Contents

DyCon Project

DyCon
DYNAMIC CONTROL
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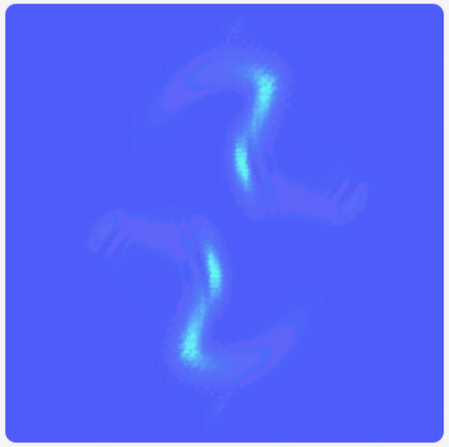
DYCON BLOG

One of the main benefits of the research conducted in the DyCon's working packages is the development of computational contents that include algorithms, articles, tutorials, visualizations, sample codes and software that will be integrated in this web...



WORK PACKAGES

DyCon project identifies and focuses on six key topics that play a central role in most of the processes arising in applications, but which are still poorly understood, namely: control of parameter dependent problems, long time horizon control...

DYCON TOOLBOX

DyCon Toolbox is a MATLAB Toolbox built for the calculation of non-linear control problems. It defines objects that represent control problems studied by the research team of the Chair of Computational Mathematics and implements methods to solve those problems.

DeustoTech UAM UNIVERSIDAD AUTONOMA DE MADRID

DyCon Team

cmc.deusto.eus/dycon/

DyCon: Dynamic Control

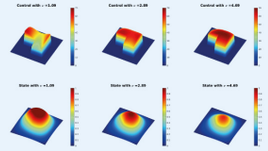
The universe is constituted by shapes in motion, while modern societies take the form of discrete and highly interconnected graphs, full of interacting agents of different nature.

We aim at developing new models, analytical and computational techniques to better integrate these two views.

Work Packages

1 Control of Parameter Dependent Problems (PDC)

Models describing real life processes depend on a large number of parameters, often uncertain and undetermined.
We develop new analytical methods and numerical tools for controlling them in a computationally efficient way.

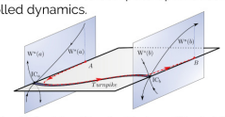


Optimal state via greedy algorithms of an elliptic parameter dependent problem, for different values of the parameter ν

Selected Findings: Adaptation and application of greedy methods to approximate optimal controls for parameterized elliptic problems. In combination with the turnpike property, the method has been adapted to time-evolving dissipative problems, yielding initial data independent greedy selections. Stochastic gradient descent methods have been successfully implemented for averaged control.

2 Long Time Control and the Turnpike Property (LTC)

The length of the time horizon influences the nature of optimal control strategies for dynamical systems and this has relevant implications in medical therapies for chronic diseases, sustainable growth, etc.
The turnpike principle ensures that optimal controls and trajectories are nearly time-independent in long time horizons and this allows to develop efficient numerical methods to compute optimal control and controlled dynamics.

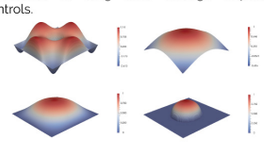


To go from A to B one takes a highway from Interchange a (IC_a) and get off at Interchange b (IC_b). From A to IC_a control action is determined by stable manifold $W^s(a)$ and from IC_b to B, it is determined by unstable manifold $W^u(b)$.

Selected Findings: The turnpike principle was found to be related to the hyperbolic behaviour of dynamical systems and shown to hold to semilinear PDE of parabolic type. It was successfully implemented on the design of new stabilisation strategies for grinding machines.

3 Control Under Constraint (CC)

Control and controlled trajectories are often submitted to constraints.
We challenge the possibility of controlling dynamical systems subject to unilateral constraints in controls and states, employing quasi-static trajectories in long time through impulsional controls.

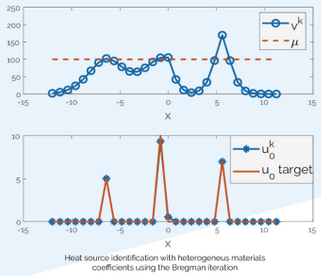


Optimal control of the obstacle problem: optimal state, target (top) optimal control, obstacle (bottom)

Selected Findings: Controllability under positivity constraints on the state for (possibly fractional) semilinear heat and wave equations, with estimates on the minimal controllability time.

4 Inverse Design and Control in the Presence of Singularities (SINV)

Dynamical systems often develop singularities: shocks, interfaces, etc. This makes it difficult to implement the classical control strategies, based on linearization arguments.
We aim at characterizing these singularities in an analytic/geometrics manner so to develop specific, well-adapted control tools.



Heat source identification with heterogeneous materials coefficients using the Bregman iteration

Selected Findings: A numerical adjoint methodology has been developed for the inverse design of the viscous Burger equation with application to the propagation of the sonic-boom produced by supersonic aircraft.

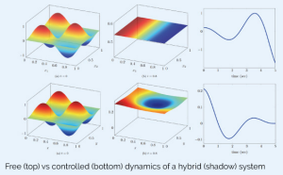
DyCon Team

Principal Investigator: Enrique Zuazua

5 Memory and Hybrid PDE/ODE Models

Optimal control strategies are harder to achieve when the dynamics is affected by memory effects.

We recast these models as hybrid PDE•ODE systems, allowing for the development of specific control methodologies.

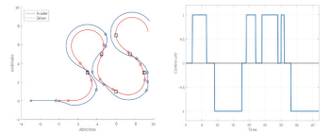


Free (top) vs controlled (bottom) dynamics of a hybrid (shadow) system

Selected Findings: Control of fractional (in space) PDE, population dynamics models with age structuring and spatial diffusion of Lotka-McKendrick type, and of evolution equations with memory terms, by means of moving control strategies.

6 From Finite to Infinite-Dimensional Models

There is an interplay interaction between finite and infinite-dimensional dynamics in the modelling and control of, for instance, collective behaviour models.
We develop finite-dimensional models for interacting agents allowing to build optimal control strategies and describe their mean-field limit.



Left : A trajectory of a sheep (red curve) which passes desired points (black boxes) by evading a dog (blue curve). Right : The control is designed to rotate the dog to drive the sheep.

Selected Findings: Control of diffusion in networks and "guidance by repulsion" models, inspired on herd and a shepherd interaction modes.

7 Computational Platform

The development of a robust computational environment is much needed in order to unify the theoretical and numerical findings and bridge the gap to applications.
The DyCon Computational Toolbox gathers the software developed within DyCon and constitutes a toolkit for future training, research, and technology transfer.

DyCon Toolbox DyConBlog

We have created two tools for sharing the valuable knowledge that was gained through the project:

DyCon Toolbox: MATLAB software platform to solve ODE and PDE constrained Optimal Control problems.
DyCon Blog: Web platform with tutorials on the existing main analytical and computational methods in Optimal Control.

Both of them are constantly updated and widened with new computational content.

Deusto University of Deusto DyCon erc DYNAMIC CONTROL CHAIR OF COMPUTATIONAL MATHEMATICS UAM Universidad Autónoma de Madrid

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Chair of Computational Mathematics (CMC)

CHAIR OF COMPUTATIONAL MATHEMATICS

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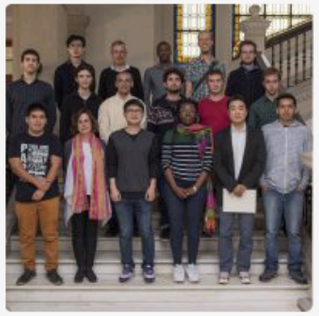


ABOUT THE CHAIR

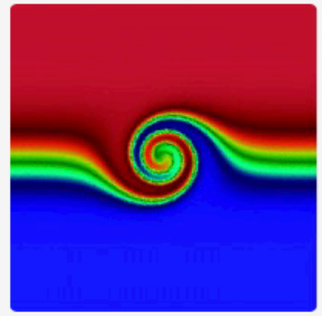
The **Chair of Computational Mathematics** of **DeustoTech** Research Center at University of Deusto (Bilbao, Basque Country, Spain) aims to develop an active research, training and outreach agenda in various aspects of Applied Mathematics. In particular, the Chair is committed with the development of ground-breaking research in the areas of Partial Differential Equations, Control Theory, Numerical Analysis and Scientific Computing; key tools for technological transfer...

Research Team & Staff

HEAD OF THE CHAIR

Enrique Zuazua (Eibar, Basque Country – Spain, 1961) is the Director of the Chair of Computational Mathematics at **DeustoTech** Laboratory in the University of Deusto, Bilbao (Basque Country-Spain) where he leads the research team funded by the European Research Council Advanced Grant "**DYCON: Dynamic Control**". He is also a Professor of the **Department of Mathematics** at Universidad Autónoma de Madrid where he holds a strategic Chair ...

Personal Page



ERC DYCON PROJECT

The Chair of Computational Mathematics is meant to hold projects related to various aspects of Applied Mathematics including **Partial Differential Equations (PDE), Numerical Analysis, Control theory and Optimal Design**. These interconnected fields have as goal the modelling, analysis, computer simulation and control and design of natural phenomena and engineering processes arising in several contexts of research, development and innovation (R+D+i)...

Project Site

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CMC webmaster Facebook Twitter

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Computational Platform

DyCon Toolbox

The MATLAB toolbox developed inside the DyCon: Dynamic Control ERC research team.

HOME | DOCUMENTATION | AUTHORS | WEB SITEMAP | CHAIR OF COMPUTATIONAL MATHEMATICS

DyConBlog

One of the main outputs of the research conducted within DyCon ERC Project is the development of new computational methods and tools (algorithms, tutorials, sample codes, software, simulations, and so on), all of which are constantly being integrated in our computational platform.

DyCon Blog offers a higher layer of the computational platform, gathering the work that is currently taking place inside the DyCon team. The goal of this computational blog is to share the valuable knowledge that was collected and gained throughout the DyCon ERC Project's life cycle.

Dissemination

Dissemination

Éibar: Ciudad de la Ciencia

La ciudad de Éibar ha sido reconocida por el Ministerio de Ciencia del Gobierno español como "Ciudad de la Ciencia"

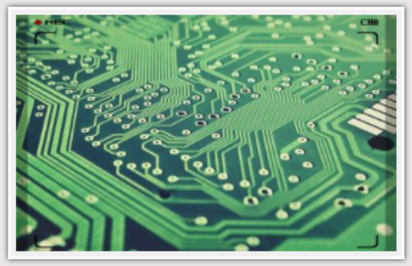
May 11, 2019
Ciencia, ciudad, Eibar

Enrique Zuazua recibe hoy la Cátedra Humboldt

Contribuirá al desarrollo de nuevas matemáticas para comprender mejor la dinámica de la Naturaleza.

May 07, 2019
Cátedra, Eibar, Enrique Zuazua, Humboldt

Opinion



Predecir y decidir

La globalización está de nuestra parte. Sin duda la humanidad en su conjunto encontrará una salida.

May 05, 2019 1 Comment
decisión, gestión, Información, predicción

Marmitako Western

Las calles están llenas de viejos vaqueros invisibles que un día llegaron a rozar el éxito, para después encontrarse sin oficio ni guion.

April 14, 2019
Cine, Empleo, Futuro

Last in mediateka

Ahoz aho 2018_01_24 Industria 4.0

Hala Bedi Irratia.'Ciencia y Emigración'
Date: 12/12/2018
00:00 27:00

Matemáticas para simular el Universo. "A Hombros de Gigantes" RNE
Date: 12/03/2018
00:00 22:18

Enrique Zuazua interviewed at Karlsruhe Institute of Technology (KIT) on Wave Propagation Phenomena (more info)
Date: 04/05/2015
00:00 48:10

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