

# REPSOL-ITMATI JRU

*REPSOL-ITMATI Joint Research Unit*

H2020 SOCIETAL CHALLENGES: Climate action, environment, resource efficiency and raw materials

## PROBLEM DESCRIPTION

A Joint Research Unit has been created in order to carry out research on mathematical and numerical methods to solve problems on a recurring basis in the daily activity at Repsol, especially in the fields of simulation and optimization of devices and processes.

## CHALLENGES AND GOALS

To increase the working life of batteries used in electric vehicles.

To improve the fast recharging process of the battery.

In the production planning in industrial facilities: to integrate into the decision-making processes the uncertainties relating to prices, demands, and the quality of raw materials and products.

PRODUCTIVE SECTOR: Energy and Environment

## MATHEMATICAL AND COMPUTATIONAL METHODS

Modelling of physical and chemical processes.

Numerical methods for solving ordinary and partial differential equations.

Mathematical optimization.

Stochastic optimization.

Control Theory.

Order reduction techniques.

Parallel programming and Supercomputing.

Use of field-programmable gate arrays (FPGAs).

Use of field-programmable analog arrays (FPAAs).

Quantum computing.



Image captured from the interface of an optimization tool under uncertainty of industrial process plants, research line 1 of the Repsol-ITMATI Joint Research Unit.

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## Results and Benefits

The competitive advantages obtained by Repsol within the framework of this collaboration are the optimization of their industrial processes, an improvement in the company's efficiency and product design and the development of decision-making tools.

This research will enable the company to reduce production costs as well as to shorten development times of new technologies and bring about more noteworthy innovations as compared with their competitors.

**Solving planning  
production problems in  
industrial processing  
plants: improved decision-  
making via mathematical  
optimization**

**Development of a  
rigorous physics-based  
simulator of batteries  
for electric cars.**



Corporate Image of the Joint Research Unit (JRU)



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de Matemática  
Industrial



Spanish Network for Mathematics & Industry (math-in)



REPSOL S.A.