EU-MATHS-IN Success story

COMPANY
Reganosa

RESEARCH CENTRE
ITMATI and Universidade de Santiago de Compostela

PRODUCTIVE SECTOR
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SS_013_2019

GANESO

Simulation and optimization of gas networks. Gas transmission network modelling, simulation and optimization.

National Natural Gas Network represented in the graphic interface of the GANESO software.

PROBLEM DESCRIPTION

Research and development on the integrated and optimal management of natural gas transmission infrastructures.

CHALLENGES AND GOALS

- ✔ Development of GANESO software, an IT tool that allow clients to interactively obtain optimal distribution of the gas flow based on different criteria, tariff calculation, simulation in transient conditions, and network expansion planning under uncertainty.

MATHEMATICAL AND COMPUTATIONAL METHODS

- ✔ Steady state and transient state simulation.
- ✔ Steady state optimization.
- ✔ Modelling with numerical simulation physical processes.
- ✔ Planning under uncertainty using s tochastic programming.
- ✔ Calculation of network access tariffs.
- ✔ Parallel computing.

In order to optimize the gas transport network, a two stage procedure has been developed:

- ✔ Disregarding some second order physical effects, a first algorithm obtains an initial solution, which is used to configure the network (compressor stations, PCVs, Based on Sequential Linear Programming techniques.
- ✔ A second algorithm refines the previous solution with the aid of a simulator Based on Control Theory techniques.

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Configuration of a case study of the Spanish Gas Network.

RESULTS AND BENEFITS

GANESO allows to study the use of current infrastructures, optimize them and assess the investment in future infrastructures, enabling, in this sense, users to make decisions regarding management and expansion of gas transportation networks.

The software helps when making strategic decisions for the company, which reduces costs. In addition, it is competitive with existing commercial tools since it presents a great advantage for the company: control over future developments, tariff calculations and can incorporate new features on demand.

Design and development of an innovative simulation and optimization software (GANESO) based on a new techniques of mathematical programming and applied mathematics.

Decision making tool.