

# Improving operating policies in stochastic optimization: an application to the medium-term hydrothermal scheduling problem

A. Perea Sánchez; A. Ramos Galán; F. Hernández González; J.D. Gómez Pérez; J.M. Latorre Canteli; P. Sanz González

## Abstract-

In decision-making under uncertainty, a robust representation of uncertainty is vital for optimal operational and strategic solutions. We extend existing methods by utilizing convergence proof for this sampling technique is provided. Moreover, two new stopping criteria are introduced for better solution accuracy and robustness. The first criterion extends traditional stopping rules to all scenario-tree nodes. The second criterion enforces a minimum count of Benders cuts per node, promoting accurate and robust solutions. Our approach is evaluated on the Spanish hydrothermal system, incorporating synthetic time series with seasonal-trend uncertainty in optimization and simulation. Policies from traditional SDDP and our technique were tested over a thousand realizations, demonstrating that our proposals yield reservoir operation policies closer to the thresholds set by the operator compared to traditional SDDP. Computational efficiency is maintained. The proposed sampling mitigates the impact of discretizing

**Index Terms-** Time series; Fourier analysis; Optimization methods; Stochastic programming; SDDP; Sampling methods

Due to copyright restriction we cannot distribute this content on the web. However, clicking on the next link, authors will be able to distribute to you the full version of the paper:

[Request full paper to the authors](#)

If your institution has an electronic subscription to Applied Energy, you can download the paper from the journal website:

[Access to the Journal website](#)

## Citation:

Gómez, J.D.; Hernández, F.; Latorre, J.M.; Perea, A.; Ramos, A.; Sanz González, P. "Improving operating policies in stochastic optimization: an application to the medium-term hydrothermal scheduling problem", *Applied Energy*, vol.359,

