

IEEE TRANSACTIONS ON POWER SYSTEMS, VOL. 22, NO. 3, AUGUST 2007 1351 Hydrothermal Scheduling Using Benders Decomposition: Accelerating Techniques Wilfredo S. Sifuentes, Student Member, IEEE, and Alberto Vargas, Senior Member, IEEE Abstract--A new decomposition method is presented that includes the network through ac modeling within the ...

Benders decomposition has been successfully applied to take advantage of underlying problem structures for various optimization problems, such as restructured power systems operation and planning. It is apparent that power system restructuring provides a major forum for the application of decomposition techniques - including the Benders decomposition ...

This paper proposes methodology for improving the performance of Benders decomposition when applied to mixed integer programs. It introduces a new technique for accelerating the ...

1354 IEEE TRANSACTIONS ON POWER SYSTEMS, VOL. 22, NO. 3, AUGUST 2007 transforming the subproblem into a set of independent optimization problems as well as greatly reducing its computational

Motivated from the structure of the model, Benders decomposition (BD) algorithm is devised. Three effective strategies named: valid inequalities, multiple generation cuts and strong high ...

continuous square of the current magnitude of branch during t in scenario, in ; continuous power injection at the reference node during t in scenario, in MW, if the system is purchasing energy from the grid during t , otherwise; continuous charging/discharging power of ESS installed at node i during t in scenario, in MW. and, if the ESS is charging during t ; and, ...

In this framework, three elements of decision-making problems in power systems are mapped into the three types of subproblems of the Benders decomposition approach and an information communication strategy is introduced. We propose a general structure of Benders decomposition for power system decision making. In this framework, three elements of ...

Benders decomposition approach divides the original problem into a ... Towards Accelerating Benders Decomposition via Reinforcement Learning Surrogate Models ... As power systems are being highly ...

Benders decomposition (or Benders' decomposition) is a technique in mathematical programming that allows the solution of very large linear programming problems that have a special block structure. This block structure often occurs in applications such as stochastic programming as the uncertainty is usually represented with scenarios.

This paper proposes an efficient solution approach based on Benders' decomposition to solve a

network-constrained ac unit commitment problem under uncertainty. The wind power production is the only source of uncertainty considered in this paper, which is modeled through a suitable set of scenarios. The proposed model is formulated as a two-stage stochastic programming problem, ...

A benders-decomposition-based transient-stability-constrained unit scheduling model utilizing cutset energy function method ... Rapid growth of load demand and concurrently system inertia deterioration put power systems at risk of transient instability. ... The transient stability depends on the accelerating power which is defined based on the ...

Accelerating the Composite Power System Planning by Benders Decomposition B. Alizadeh*, S. Jadid
Department of Electrical Engineering, Iran University of Science & Technology, Tehran, Iran ABSTRACT
This paper presents an application of Benders decomposition to deal with the complexities in the simultaneous

A solution technique based on Benders Decomposition is developed, implemented, and successfully applied to a real problem for a major food firm with 17 commodity classes, 14 plants, 45 possible distribution center sites, and 121 customer zones. An essentially optimal solution was found and proven with a surprisingly small number of Benders cuts.

Benders decomposition has been successfully applied to take advantage of underlying problem structures for various optimization problems, such as restructured power systems operation ...

Accelerating Benders decomposition for short-term hydropower maintenance scheduling. ... a review of the optimization approaches in the literature for the integration of DR in three central problems in power systems planning, namely optimal power flow, unit commitment, and generation and transmission expansion planning. ...

distribution networks, where the Benders decomposition algorithm can be appropriately used [21, 22]. With reference to [23] for the concept and procedure of Benders decomposition, the ESS allocation problem was decomposed into a storage planning master problem (MP) and sequentially-solvable SPs reflecting the operational strategy in [24].

This paper addresses the decision-making problem associated with generation and network investments within the context of co-optimized transmission and distribution system planning. The proposed expansion planning problem differs from existing formulations due to the joint consideration of three major complicating factors. First, discrete generation investments ...

Benders decomposition is generalized to the problem whose subproblem could be nonlinear (Geoffrion, 1972), and its convergence properties are provided (Sahinidis & Grossmann, 1991). A Benders hierarchical decomposition approach is also proposed to handle non-convexity for power transmission network design (Binato, Pereira, & Granville, 2001).

The focal decomposition method of this paper is Benders decomposition (BD), which decomposes stochastic optimization problems on the basis of scenario independence. In this paper we propose a method of accelerating BD with the aid of a surrogate model in place of an NP-hard integer master problem. Through the acceleration method we observe 30% ...

This work presents several options to improve the convergence of the Benders algorithm, one of the most applied methodologies on the security constrained unit commitment problem. Security Constrained Unit Commitment is a large scale optimization problem of fundamental application in modern power system operation control centers. Benders ...

Benders" decomposition dividesthe two-stage SP into two parts: a master problem that deals with investment and a subproblem that deals with operation. A specific problem instance will comprise all the data necessary to define these two stages. That is: the full power system, with existing generation and network data, as well

The proposed method can be extended to other applications of BD for solving the large-scale optimization problems in power systems operation, maintenance, and planning. Original language: English: Pages (from-to) 339-376: Number of pages: 38: Journal: ... Accelerating the benders decomposition for network-constrained unit commitment problems ...

The results indicate that above some point between 50 to 100 scenarios, the parallel Benders decomposition with acceleration techniques outperformed the computational time of the solution with the MILP solver (Fig. 7). ... IEEE Transactions on Power Systems, 23 (3) (2008), pp. 1115-1124. View in Scopus Google Scholar. Canto, 2008.

To accelerate the convergence of the proposed Benders decomposition algorithm, this study also presents a multi-cut reformulation and a cut-loop stabilization strategy for Benders acceleration. Numerical experiments based on the well-studied Turkish network and AP dataset corroborate the advantages of the proposed models and the effectiveness ...

Benders decomposition method is a well-known decomposition method and enjoys a lot of applications in mathematical programming after the seminal publication by Benders in 1962 energy and power systems, and many more problem depended stabilization and acceleration techniques are a major field of research; ...

The generalization of this approach to nonlinear problems was presented by Arthur Geoffrion [2]. He called it the Generalized Benders Decomposition (GBD). As in the original work by Benders, constraints in the master problem were defined with the help of Lagrangians of the respective primal problems.

Production-distribution companies (such as electrical power systems) intended to supply commodity to their

customers in an economical and reliable manner. ... Gendreau, M.: Accelerating Benders decomposition for closed-loop supply chain network design: case of used durable products with different quality levels. Eur. J. Oper. Res. 251(3), 830 ...

A novel integration of Benders cuts was used to prevent the growth of master problem and improve both lower and upper bounds by simultaneously adding multiple feasibility and optimality cuts. Benders decomposition (BD) is a well-known approach that has been successfully applied to various mathematical programming problems. According to previous ...

Acceleration strategies of Benders decomposition for the security constraints power system expansion planning 10 September 2015 | Annals of Operations Research, Vol. 235, No. 1 The recoverable robust facility location problem

That is: the full power system, with existing generation and network data, as well as the candidate lines and their costs. Then, for every scenario, the data that defines operation in that case must be specified. ... It reviews and classifies the techniques that are available for the acceleration of Benders" decomposition. This review was yet ...

It has been more than five decades since the Benders Decomposition (BD) algorithm was proposed by Benders (1962), with the main objective of tackling problems with complicating variables, which, when temporarily fixed, yield a problem significantly easier to handle. The BD method (also referred to as variable partitioning, Zaourar and Malick (2014), ...

The advantages and disadvantages of the methodologies for the optimization of wind energy systems were also given. The Bender decomposition method [26], the Nash equilibrium method [27], and game ...

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